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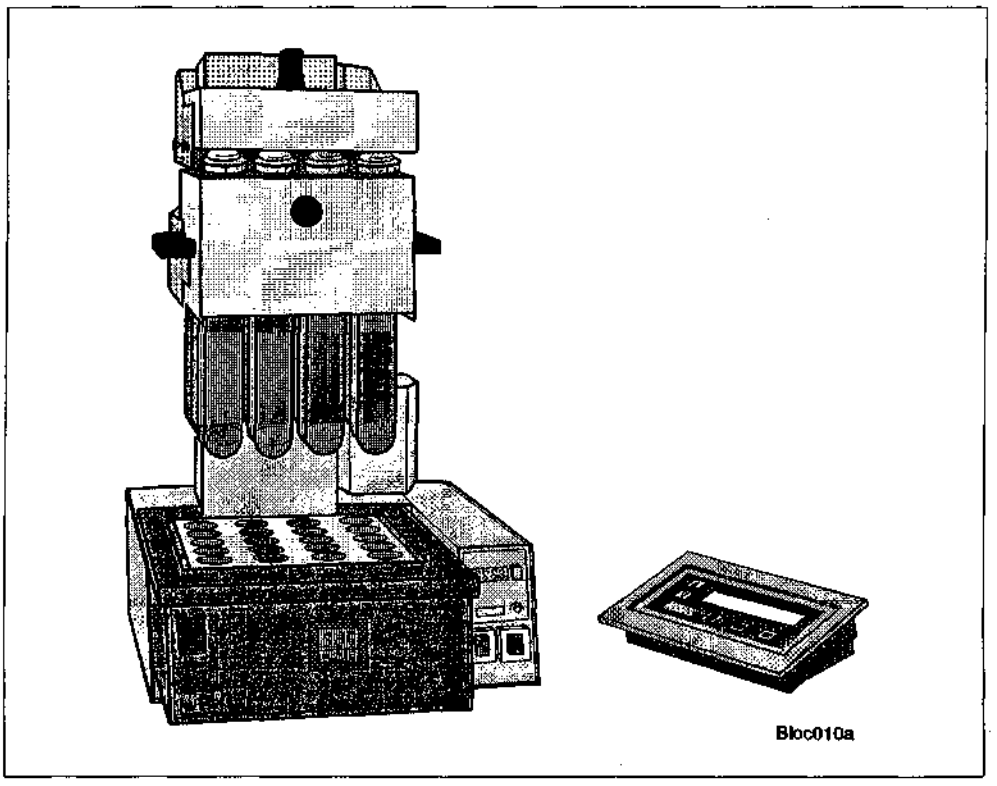

Service Manual 2000 Digestion Unit

1000 6345 / Rev 1.1

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Tecator AB, Box 70, S-263 21 Höganäs, Sweden

This document contains service information for Tecator products as indicated on the front cover.

Revision	Date of issue	Revised material
Rev 1.0	1995-04-12	
Rev 1.1	1996-01-11	Included information concerning, 2015 Lift and 2001 Scrubber

Note! **Please note that all information is liable to change without previous notice.**

Please inform

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if you have any opinions or proposals for change of this manual.

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1 GENERAL

1.1 Introduction

This manual contains material for the different of Digestion Systems, Lift system, Control Systems and Fume Removal System.

1.2 Terms of limited warranty

All tecator products are warranted against defects in materials and workmanship under normal use in accordance with Tecator terms of sale. The warranty period is one year for replacements parts. The warranty period becomes effective at installation (or 3 months from date of shipment), whichever occurs first. No other warranty is expressed or implied.

Tecator further guarantees that the goods have been thoroughly checked and tested before shipment and that they are free of mechanical and electrical defects. Should defects due to faulty material or workmanship develop during the WARRANTY PERIOD, parts will be supplied on a no-charge basis in accordance with Tecator terms of sale (except for expendable materials).

The Seller accepts no contingent liability and shall in no event be liable for consequential damages.

Warranty Disclaimer

Local market regulations and market conditions may require a change of the above stated warranty. Please check with the local Tecator distributor to confirm the prevailing warranty policy for your area.

1.3 Safety precautions

Caution!

For the safety of the operator and service technician the apparatus should be correctly earthed by the mains cord or by the separate earthing screw.

Never use these Systems if it is in need of adjustment and/or repair. Do not make any changes or modifications to the equipment that may effect safety. All changes or modifications require written approval from Tecator.

The Systems may be repaired only by Tecator or by other personnel approved from Tecator.
Only genuine Tecator parts may be used in the analysis equipments.

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2 TECHNICAL DESCRIPTION

See attached datasheet part no 9999 0720.

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3 FUNCTIONAL AND OPERATION DESCRIPTION

See attached users manuals:

2000 Digestion System, part no 1000 5548
2015/1015 Lift System, part no 1000 5221

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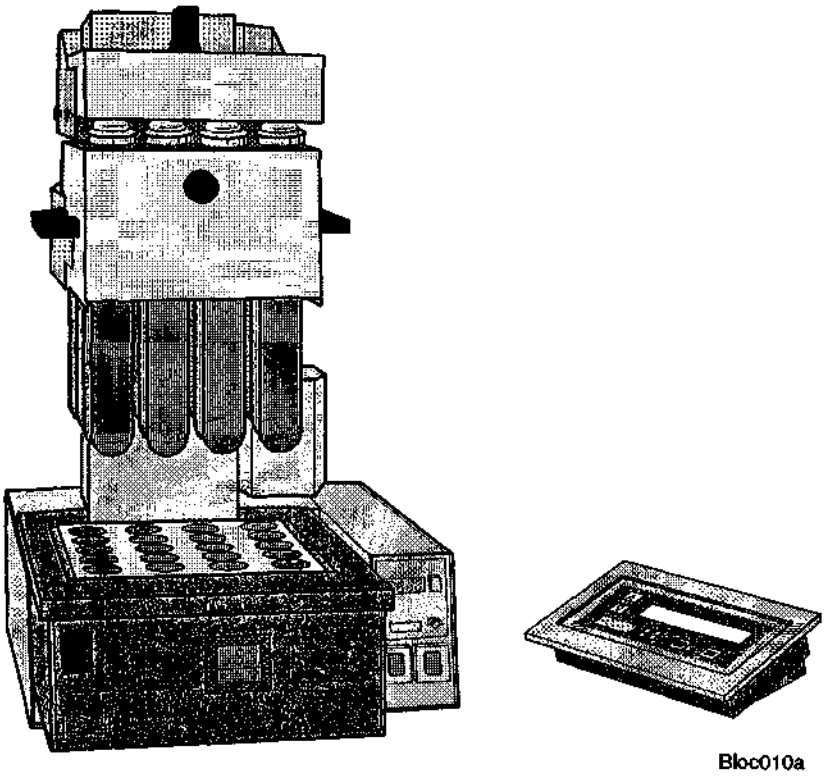

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2000
Digestion System

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1 SAFETY PRECAUTIONS AND PROCEDURES

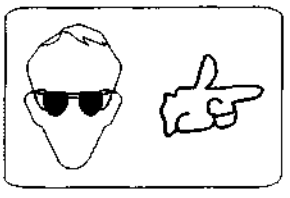
1.1 Intended use

The 2000 Digestion System is designed for laboratory use for analysing parameters as specified in Tecator's Application Notes.

1.2 Safety precautions

Please read these operating instructions carefully and act accordingly.

For safety reasons people not familiar with these operating instructions must not use the instrument.



⚠ Warning

Careful handling of the solutions used in an analysis is mandatory for laboratory safety. Refer to the appropriate material safety data sheet for reagent handling instructions.
Eye protection should be worn at all times and care should be taken when handling hot digestion tubes.

⚠ Warning!

This device is equipped with a grounding/earthing type power plug for your protection against electrical shock hazard and should only be attached to a properly grounded/earthed receptacle.

⚠ Warning!

Before replacing the fuses, disconnect incoming mains supply.

⚠ Warning!

Electrical shock hazard. Covers or panel(s) should be removed by qualified personnel only.

Hot surface!

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Caution!

The responsible body shall be made aware that, if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Modifications, alterations, rebuilding or use of safety parts not authorized by Tecator AB violates the warranty. Tecator AB has no responsibility for damages, material or personal, occurring as a result of such actions.

2000 Digestion System. Instruction Manual, Rev. 2.0 09/95 Part no 1000 5548. Tecator AB, Sweden

2 INTRODUCTION

2.1 Brief description

This manual covers the different types of Digestion Systems, Control Systems, Fume Removal Systems and Accessories for digestion supplied by Tecator.

The basis of Tecator's **Digestion Systems**, is one of the four Digestion Units (2006, 2012, 2020 and 2040). They are convenient tools for digestion sample preparation within a range of 50- 440°C .

To remove the fumes generated during digestion, different **Exhaust Systems** can be combined with the digestor. By adding a **Flow Regulator** or a **Scrubber Unit** to the Exhaust System, the water flow can be controlled automatically.

For eliminating emission of corrosive gases in the laboratory and to the environment, a **Scrubber** should be used. The unit also eliminates the need for a separate water supply for the exhaust system.

The Digestion System is a part of the Kjeltec system and can be combined with suitable Distilling and Titration Units, to run determinations of nitrogen/protein in accordance with official methods. It can as well be used for other wet digestions in a number of different applications.

To simplify the handling and timing, the 2015 **Lift System** from Tecator can also be integrated with the digestor.

By using the **Controller**, different time and temperature cycles can be programmed to control the digestor. The **Lift system**, the **Scrubber** or the **Flow Regulator** can also be controlled, thus making a totally automated digestion possible.

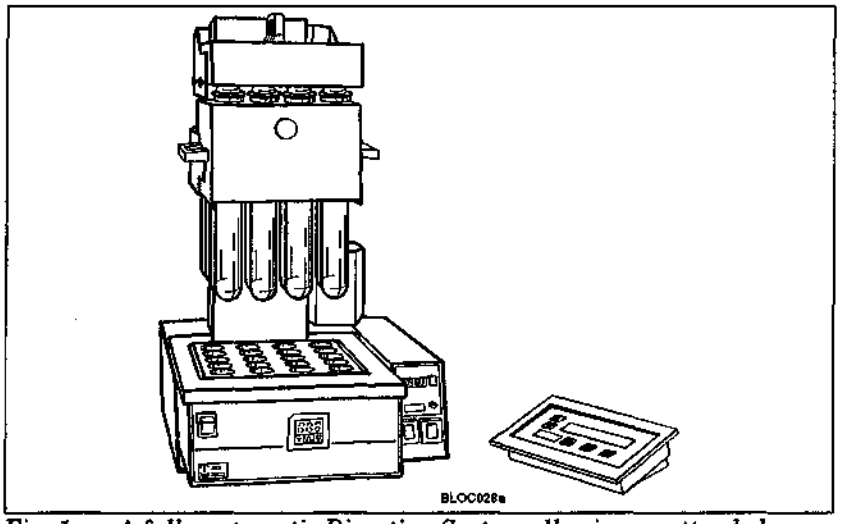

Fig. 1 A fully automatic Digestion System allowing unattended operation.

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2.2 Performance data

	2006 Digestor	2012 Digestor	2020 Digestor	2040 Digestor
Temperature range:	100-440° C	100-440° C	100-440° C	100-440° C
Temp. setting repeatabilbity:	1°C	1°C	1° C	1°C
Temp. readout	Digital	Digital	Digital	Digital
Heater indication:	LED	LED	LED	LED
Overtemperature protection	Yes	Yes	Yes	Yes
Temp. stability at 100° C with the Controller:	±5 ±2	±5 ±2	±5 ±2	±5 ±2
Temp. stability at 400° C with the Controller:	±3 ±1	±3 ±1	±3 ±1	±3 ±1
Heating time 20 to 400° C at 230 V:	30 min	30 min	40 min	40 min
Tubes/batch:	6	12	20	40
Tube size:	250 ml	100 ml	250 ml	100 ml
Sample size* solids:	up to 5 g	up to 1 g	up to 5 g	up to 1 g
Sample size* liquids:	up to 15 ml	up to 3 ml	up to 15 ml	up to 3 ml
2000 Controller	Programmable in 9 steps. Temperature 20-440° C. Time from 1 minute up to 99 hours and 59 minutes. Can control all the Digestors, the Lift, the Scrubber and the Flow Regulator.			
** Note: Larger samples require special procedures. Please see the relevant Application notes or consult our Customer Service Laboratory.*				

2000 Digestion System, Instruction Manual, Rev. 2.0 09/95 Part no 1000 5548, Tecator AB, Sweden

3 PREPARATIONS FOR USE

3.1 Unpacking and checking

Unpack the Digestion Unit and its accessories with care.
Remove all packing material from the equipment.
Use the packing list provided with the unit to check that you have received all parts.

If you have any questions, please contact your Tecator representative or Tecator.

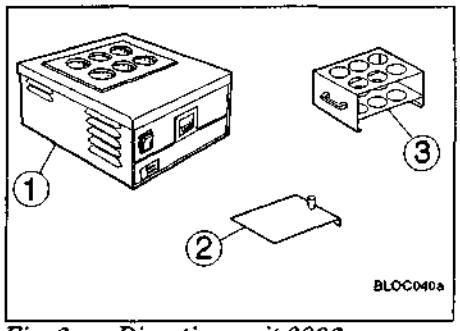

Fig. 2 Digestion unit 2006.

Digestion unit 2006

Position	Description
1	Digestor DS-6
2	Heat shield
3	Rack for 6 tubes

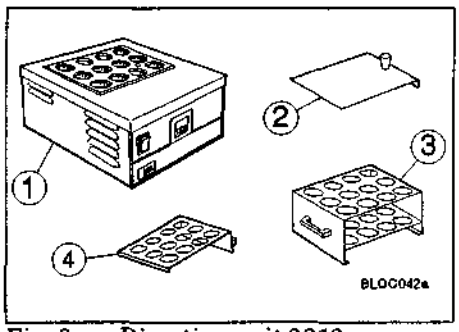

Fig. 3 Digestion unit 2012.

Digestion unit 2012

Position	Description
1	Digestor DS-12
2	Heat shield
3	Rack for 12 tubes
4	Retainer plate

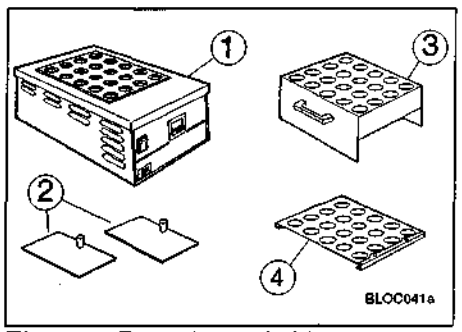

Fig. 4 Digestion unit 2020.

Digestion unit 2020

Position	Description
1	Digestor DS-20
2	Heat shields
3	Rack for 20 tubes
4	Retainer plate

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Digestion unit 2040

Position	Description
1	Digestor DS-40
2	Heat shields
3	Rack for 40 tubes
4	Retainer plate

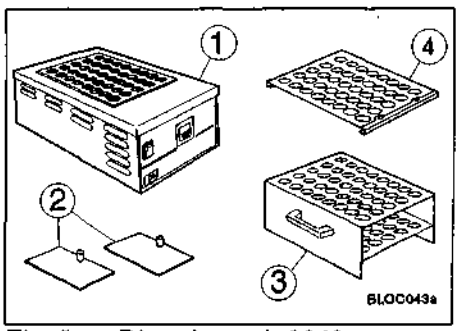

Fig. 5 Digestion unit 2040.

Controller unit 2000-001

Position	Description
1	Controller unit
2	Cable
3	Cables

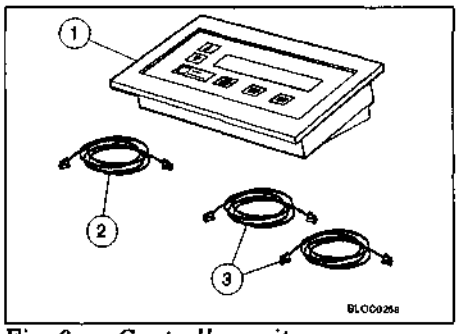

Fig. 6 Controller unit.

Flow regulator 2000-010

Position	Description
1	Flow regulator
2	Cable

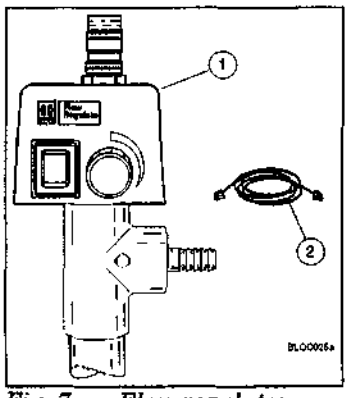

Fig. 7 Flow regulator.

Scrubber Unit 2001-001

Position	Description
1	Scrubber unit

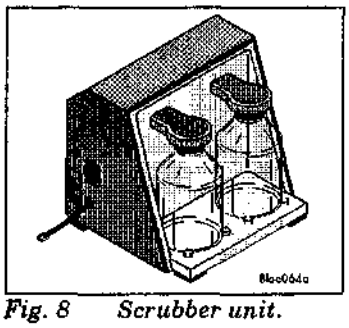

Fig. 8 Scrubber unit.

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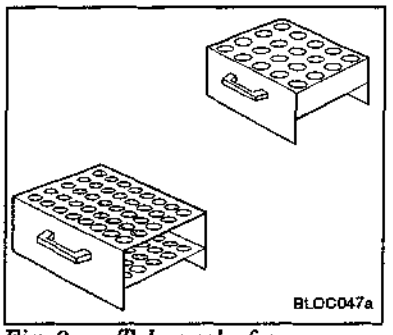

Fig. 9 Tube racks for digestion tubes, DS-20 and DS-40.

3.2 Assembly

The Digestion Unit itself comes fully assembled, but the rack for the digestion tubes for DS-20 and DS-40 needs to be assembled (see fig.9). First fasten the two handles in the two upper pairs of holes in the rack. Use the screws supplied. The handles are asymmetrical. **Fasten them with the flat side facing down.** Then fasten the lower plate for the rack in the lower holes. Use the screws and nuts supplied.

3.2.1 Exhaust System for individual handling of tubes for DS-6

The Exhaust System for Individual Handling of tubes for DS - 6 must be assembled as follows:

Use fig.10 for reference.

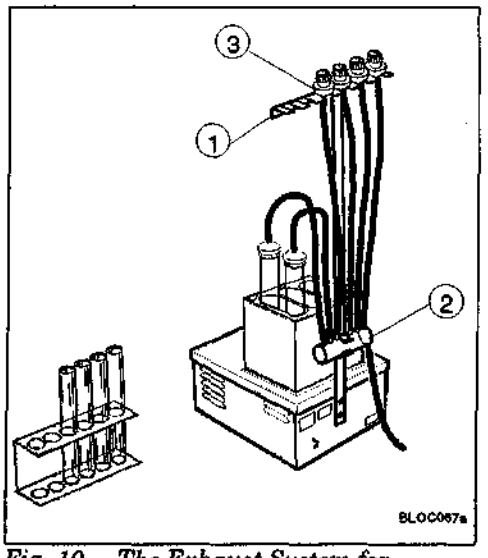

Fig. 10 The Exhaust System for individual handling.

a) Mount the exhaust cap stand, pos1, in the predrilled holes with two screws and two spacers. Attach the stand to the rear of the Digestion Unit, using the two screws supplied. Referring to fig.10, see that the stand is attached correctly.

b) Moisten (with water) the six tubing connectors on the glass exhaust receiver, pos2, and secure a short tube on each outlet.

c) Slide the glass exhaust receiver into position in the plastic holder. Turn the outlet towards the cold water tap to which the Exhaust System later will be connected.

d) Moisten the tubing connectors on the exhaust caps, pos3, and attach the other end of the tubing. Cut off a small piece of tubing if necessary, so that the exhaust caps will rest safely in their holders on the upper part of the exhaust cap stand.

e) Secure the long special tubing on the outlet to the exhaust receiver.

f) The other end of this tubing is connected to the water aspirator or scrubber unit.

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3.3 Installation requirements

This table is translated.

2006 and 2012 Digestor	
Power supply	200-230V or 100-115V, 50-60 Hz
Power consumption	1000 W
Water supply: Exhaust	~5 l/min for 5 min then 1-2 l/min. Not needed with Scrubber.
Weight	10kg
Dimensions, LxDxH	28x31x14 cm
Ventilation requirement	Exhaust system and Fume hood
Recommended bench space	0,6 m
2020 and 2040 Digestor	
Power supply	200-230V, 50-60 Hz
Power consumption	1860 W
Water supply: Exhaust	~5 l/min for 5 min then 1-2 l/min. Not needed with Scrubber.
Weight	19 kg
Dimensions, LxDxH	32x48x14 cm
Ventilation requirement	Exhaust System and fume hood
Recommended bench space	1m or 0.4 m if a Lift is used
2000 Controller	
Power supply	None, connects to the Digestor
Weight	0.6 kg
Dimensions, LxDxH	17x13x5 cm
Flow Regulator	
Power supply	200-230V or 100-115V, 50-60 Hz
Power consumtion	15 W
Weight	1.0 kg
Dimensions, LxDxH	10x10x15 cm
2001 Scrubber Unit	
Power supply	100/110/200/230 V, 50-60 Hz
Power consumption	150 W
Water supply	No
Weight	13 kg
Dimensions, LxDxH	340x330x340
Ventilation requirement	Connection to Fume hood possible

3.3.1 Input and output connections

3.3.1.1 2006, 2012, 2020 and 2040 Digestor

Under the front:
There is one Modular 8/8 connector for the 2000 Controller.

3.3.1.2 2000 Controller

At the rear:

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There are two interchangeable Modular 6/6 connectors to control the functions of the 2015 Lift System, Flow Regulator, 2001 Scrubber Unit or Scrubber interface.
There is also one Modular 8/8 connector for one of the 2000 series Digestor Units.
One 9-pin D-SUB for PC.

3.3.1.3 Flow Regulator

Under the front:
There is one Modular 6/6 connector for the 2000 Controller.

3.3.1.4 2001 Scrubber Unit

On the left side:
There is one cable with a Modular 6/6 connector for the 2000 Controller.

3.3.2 Fuses

3.3.2.1 2001 Scrubber unit

Choose the appropriate fuse in accordance with the following table:
Primary fuses:

100V	2x T 3.15 A
110V	2x T 2.5 A
200V	2x T 1.6 A
230V	2x T 1.6 A

Secondary fuse:
T 2.5 A

3.4 Installation instructions

3.4.1 Digestion Unit

The Digestion System should always be used together with an Exhaust System or a Reflux Condensor and it must be installed close to a cold water tap and appropriate power supply.

Please check on the back of the unit that the specified voltage agrees with the power supply.
If a Scrubber unit (see Complete Digestion System, section 9.1) is used, the water supply is not necessary.
It is always recommended to place the system in a fume cupboard if available.

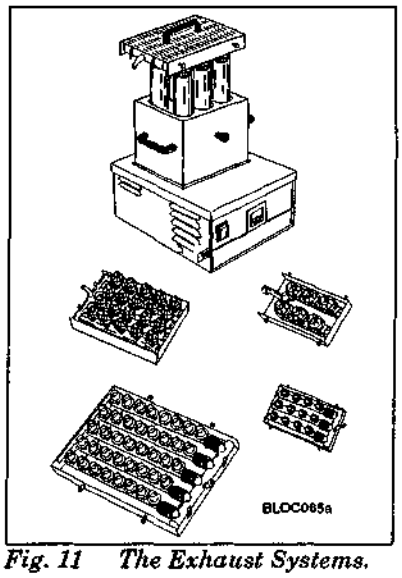

Fig. 11 The Exhaust Systems.

3.4.2 Exhaust System

The Exhaust System consists of an exhaust manifold, a water aspirator and a stand with a drip pan for the exhaust manifold. An optional Flow Regulator can be used in conjuction with the Water Aspirator.

3.4.2.1 Flow Regulator

Connect the upper snap in part of the Flow Regulator to the cold water tap (ordinary diameter: 1/2"). An internal thread in the upper part can be unscrewed to fit a water tap with a larger diameter (3/4").
Then screw the water aspirator to the fitting that is underneath the Flow Regulator.
Connect the mains cable to the wall socket.

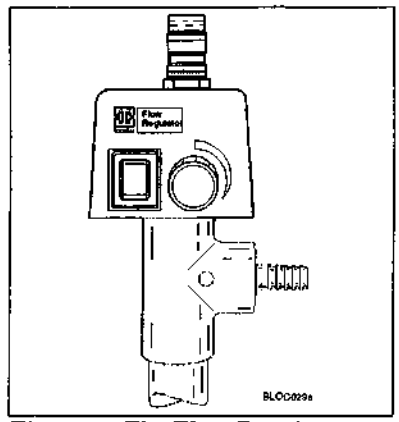

Fig. 12 The Flow Regulator and the Water Aspirator (broken line).

3.4.2.2 Adjustment of the Flow regulator

- Press the switch to position I.
- Open the water tap to the maximum flow that will be used for the 'High' flow during digestion.
- Turn the knob counter-clockwise to the end postion.
- Press the switch to position II.
- Turn the knob clockwise to the flow that will be used for the 'LOW' flow during digestion.

It is preferable to make the last adjustment during the first digestion performed.
After the time for the 'High' flow has passed, press the switch to position II.
Please note that the knob must be turned completely to the end position. Then adjust to the flow that is to be used. The Flow Regulator can, after the initial adjustment, be controlled from the controller 2000 when the switch is in the 0 position.

3.4.2.3 Scrubber unit

Please check at the back of the unit that the specified voltage agrees with the power supply. Connect the Scrubber to the socket.
Connect the tubing on the top of the unit to the exhaust manifold. If desired, a ventilation tube can be connected from the outlet of the unit to a fume hood or another suitable ventilation system.

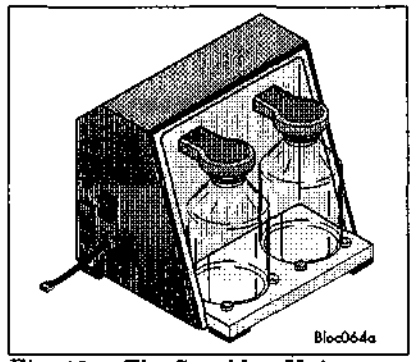

Fig. 13 The Scrubber Unit.

3.4.2.4 Adjustment of Scrubber unit

The Scrubber can be manually operated.
Switching from high to low exhaust settings can easily be done using the switch on the left side of the unit.

Press the switch to position II for maximum suction, high exhaust, during the initial part of the digestion.

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For reduced suction, exhaust low, press the switch to position I. Regulate the suction with the lever on the right side of the Scrubber Unit, to the suction level where the fumes just are retained in the tube. Watch for the condensation inside the tube. It is preferable to make the last adjustment during the first digestion being performed with the Scrubber unit. For automatic operation the switch must be set in 0 position, see section 4.5.5

3.4.2.5 Reagents for Scrubber unit

The Scrubber unit operates with an air pump that transports the evaporated fumes first through an acid trap (left flask) and then to a neutralizing solution (right flask). The air flow is ventilated through an outlet on the rear.

Note! The cap with an extra splash plate fitted should be used with the flask to the right.

Neutralising solution:
The condensation flask to the left should be filled, to the minimum level with water, to preclean the gases and to prolong the lifetime of the scrubber reagents. The flask to the right should contain a solution of 0.4 litre sodium hydroxide (40%) and 0.8 litres of water. This solution is sufficient for up to 100 Kjeldahl digestions, i.e. 5 batches of 20 250 ml tubes. To have a secure way to know when the neutralising solution is saturated a suitable acid/base indicator can be added, i.e. bromothymol blue, BTB.

Note! The flask to the right should not be filled above the maximum level.

3.4.2.6 Water aspirator supplied with DS-6 and DS-12

Connect the water aspirator to the cold water tap (ordinary diameter: 1/2") or the Flow Regulator. The upper part can be unscrewed to fit a water tap with a larger diameter (3/4").

A piece of tubing (not supplied) attached to the lower part of the water aspirator and directed down into the sink drain will considerably reduce the noise level.

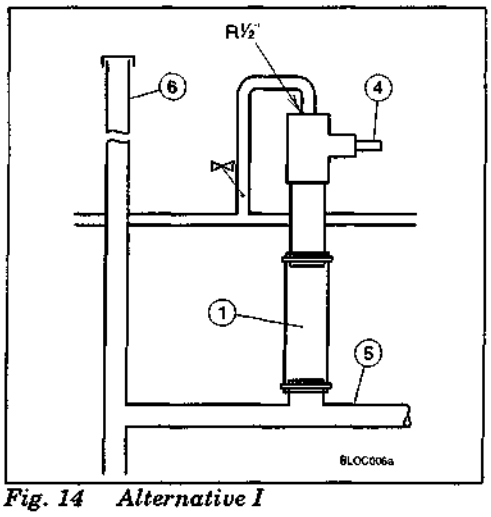

Fig. 14 Alternative I

3.4.2.7 Water aspirator supplied with Exhaust System for DS-20 and DS-40

Alternative I , see fig.14

Connect the water aspirator directly to the drain pipe (5) with a piece of tubing (1) (not supplied). Note that the waste pipe must have an air outlet (6) somewhere to prevent counter-pressure in the tubing (1).

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Alternative II, see fig.15

The lower part of the water aspirator is put through a cover (2) over the sink. The air is led out through a hole in the cover via a piece of tubing (3) connected to a fume cupboard or a vent. The diameter of this tubing should be about 40 mm. The ventilation tubing (part no 1000 0516) can be used.

For both alternatives the tubing supplied with the Exhaust System should be connected from the manifold to the vacuum connection (4) on the water aspirator. Cut the tubing as short as possible. It should be just long enough so it can be operated during digestion without bends or kinks. Make sure that the manifold can be placed on the digestion tubes when the tubes are placed in the block and that it is possible to lift out the tubes onto the cooling rack with the manifold still in place. The exhaust must also be used during the cooling stage.

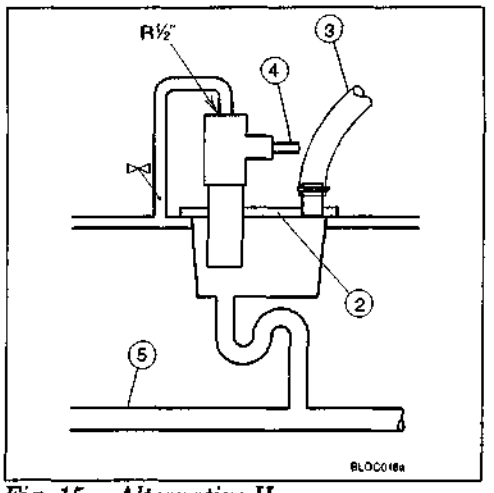

Fig. 15 Alternative II

Now choose the most convenient location for the Digestion unit on the laboratory bench, or in a fume cupboard. The maximum distance to the cold water tap should be the length of the long tubing, but preferably shorter.

It is important for the proper function of the exhaust system that the tubing from the exhaust receiver to the water aspirator does not form any bends or kinks.

Because acid will condense in the tubing during the digestion, cut off the long special tubing to a suitable length and connect it to the water aspirator.

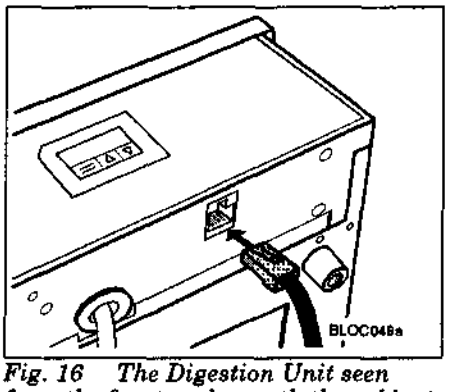

Fig. 16 The Digestion Unit seen from the front underneath the cabinet.

3.4.3 Controller

The Controller draws its power from the connected Digestor.
Connect the cable with the 8-pin contact, in the front underneath the cabinet of the Digestion Unit, to E on the Controller unit (see figs.16 and 17).
When the Lift System is to be connected with the Controller, use the contact that is situated on the back of the Lift Unit. The Flow Regulator and the Scrubber both have communication contacts on the front. For all alternatives, you must connect the 6-pin contact cable to either A or B.

There are two alternative locations for the controller. It is delivered to be placed on the laboratory bench. If the controller is to be placed on the wall, unscrew the four nuts

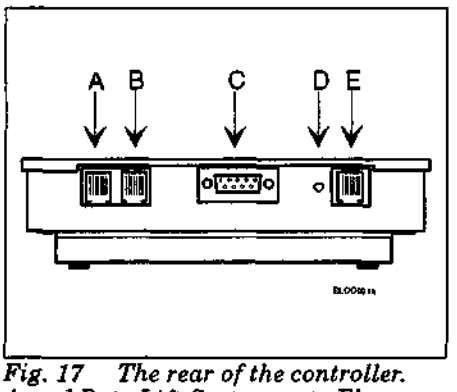

Fig. 17 The rear of the controller.
A and B: to Lift System or to Flow Regulator or to Scrubber Unit
C: to PC
D: adjustment of contrast of display
E: to Digestion Unit

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that hold the plate at the back of the unit. Then turn the plate 180 degrees and screw back the four nuts.

Note! Avoid placing the controller in the fume cupboard as accidental spillage of acid can cause damage.

3.4.3.1 Checking and changing set Digestor type

When you turn on the power you will see the type of Digestor that is preprogrammed for a few seconds in the display:

```
TECATOR        DS-XX
v.ZZ.ZZ ==*==000000
```

To check the type of Digestor that is preprogrammed, proceed as follows:

- Press TEMP, and while holding TEMP, press RUN/STOP
- The display shows in this example that the controller is set for a DS-20 :

```
TECATOR        DS-20
 00   06   12 *20* 40
```

If the Digestor type shown in the display of the Controller is not the Digestor that is to be used, the following steps have to be taken.

- Press the ▲ ▼ button, up or down, to change the Digestor type.
- Press RUN/STOP to confirm set Digestor type, and then the Controller returns to the working menu:

```
#:1  T: XXX    YY:YY
STOP    ZZZ
```

Note! *00* is used when heat sources other than Tecator Digestors are connected to the Controller.

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3.5 Function

The different **Digestors** are designed for temperatures from 50°C to 440°C. All four Tecator Digestors can be integrated in systems to make the digestion more automatic.

The **Flow Regulator** makes it easy to adjust the flow through a connected water aspirator. It can be set to three different positions where the flow is either at a maximum, minimum or no flow at all through the water aspirator. This can be controlled automatically by the Controller Unit.

The **Scrubber Unit** eliminates emission of corrosive exhausts to the laboratory environment and the atmosphere. The unit also makes it possible to operate the exhaust system without the need for a water supply. The Scrubber unit can be operated manually or controlled automatically by the Controller Unit.

The use of a **Lift System** minimizes the manual handling during the digestion. This system also secures that close control of the digestion conditions is obtained i.e. digestion time will always be the same.

The **2000 Controller Unit** is used together with the Digestion unit types 2006, 2012, 2020 and 2040 as well as the Lift System, the Scrubber Unit and the Flow Regulator.

The **Controller** is programmable in nine steps, and both temperature and time can be set.
When a Lift System is integrated with the Digestion Unit, the start and stop steps of the Lift System are controlled. When a Scrubber or a Flow Regulator is integrated, their procedures are programmed into the Controller Unit.

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4 OPERATING INSTRUCTIONS

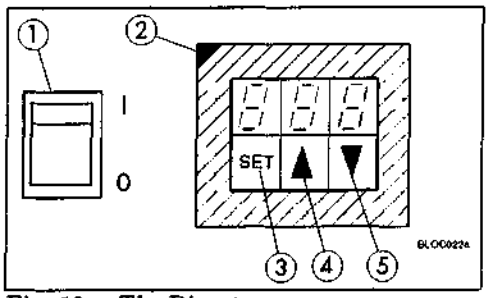

Fig. 18 The Digestors.

4.1 Identification of operating controls and symbols

These tables are translated.

Fig.18	Operating controls Digestors
1	Power
2	Heating indicator lamp
3	Select set point
4	Increase set value
5	Decrease set value

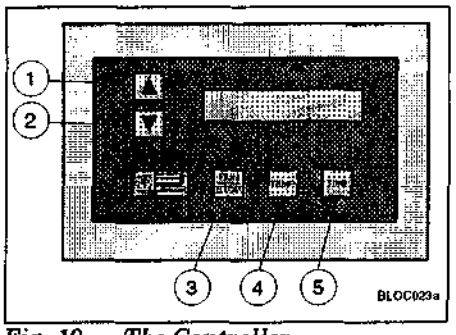

Fig. 19 The Controller.

Fig.19	Operating controls Controller
1	Increase
2	Decrease
3	Run/Stop
4	Select temp
5	Select time

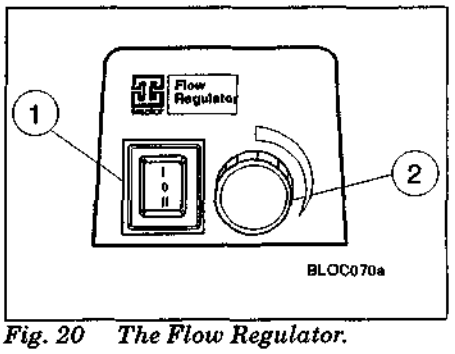

Fig. 20 The Flow Regulator.

Fig.20	Operating controls Flow Regulator
1	Operation mode selector
2	Flow rate adjustor

4.2 Operation

Tecator's Digestion Systems can be used for a number of different types of analysis. Application Notes are available from your Tecator representative upon request.

Note! Most digestion applications involve strong chemicals and high temperatures, which makes it important to follow the safety regulations. Always protect your eyes and use protective gloves and garments.

4.3 Starting the Digestor

- Press the mains switch to start the Digestor.
- The set temperature is displayed for one second, followed by the actual temperature in the Digestor.
- If the actual temperature is lower than the set value, a steady light will appear in the heating indicator lamp, see fig.18, showing that the Digestor is heating.
- When the set temperature is reached in the Digestor, the heating indicator lamp will flash.

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4.3.1 Changing the set temperature

- Press and hold the function key marked 'SET'.
- The set temperature is changed by pressing and holding down the function keys marked ▲ ▼.
- The maximum value is 440°C and the minimum value is 50°C.

Note! If there is any malfunction in the Digestor, the display will show an error message.

4.4 Preparing samples before digestion

- Add the weighed sample and the chemicals and/or the reagents to the digestion tubes according to the application to be performed.
- Place the digestion tubes in the tube rack and place it beside the Digestor.
- Check that the Digestor has reached the correct temperature.
- If the Controller is used, check that the correct settings are programmed.
- Turn on the water tap fully or as the application requires.
- Hang the heat shields in position on the rack.

4.5 Programming the Controller

4.5.1 Starting the Controller

When the Digestor is switched on, the Controller will beep and go through a check routine for some seconds before the working menu is shown in the display:

```
#:1  T: XXX   YY:YY
STOP    ZZZ
```

```
 #:1  =  The first step, always shown first
XXX   =  Set temperature for the first step
YY:YY =  Set time for the first step in hours
         and minutes
STOP  =  Stop
ZZZ   =  The actual temperature in the
         Digestor
```

4.5.2 Programming the temperature and time cycles for the Digestor

- After Power On, the first step shown is

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```
#1  T: XXX    YY:YY
STOP   ZZZ
```

- By pressing ▲▼, the desired step is chosen
- When the desired step is reached and shown in the display, the temperature and time can be set for that step.

Changing the temperature:

- Press and hold TEMP, press ▲▼ to the desired temperature. Max 440°C, Min 10°C.

Note! The set temperature in the Digestor must be equal to or higher than the highest temperature in any cycle.

Changing the time:

- Press and hold TIME, press ▲▼ to the desired time. Max 99:59, Min 00:00

Note! When holding down ▲▼ and scrolling, the digits will start moving faster after some seconds.

When the desired temperature and time are set for this step, the next step can be set. The procedure is repeated for up to 9 steps.

Note! A step where the time is set to 00:00 is called a stop step. The programmed cycle will stop at this step and the set temperature will be maintained

To run the digestor at a constant temperature for a prolonged time set the temperature to the desired value and program the time to 00:00 and press run. The set temperature will be maintained until shut-down of the system.

It is possible to preprogram several cycles starting from different steps if stop steps are used.

The function of the step/time programming is as follows:
The time for first step in any cycle is always measured from the point where the digestor have reached the set temperature. In all other following steps, time is always measured directly from the start.

4.5.3 Start of the Digestor

See 4.6 regarding handling of the tube rack before digestion. The Digestor starts to heat up when the RUN/STOP button is pressed and it does not matter which step is choosen.

Note! The count down for the first programmed step starts when the preset temperature is reached.

4.5.4 Setting the delay time

This function makes it possible to set a delay time for the start of the digestion.

- Press the TEMP + TIME keys and hold, then press the RUN-STOP key and the display will show.

```
DELAY TIME
 T=00:00
```

- Press ▲▼ until the desired delay time, in hours and minutes, is shown in the display.
- Press the RUN-STOP key to confirm the time.
- The delay time settings will be cleared after each cycle.

4.5.5 Scrubber Unit or Flow Regulator connected

During the first 10 to 15 minutes of the digestion, depending on application, a considerable amount of fume vapours are released from the chemicals and samples. To be able to remove these fumes, a high suction capacity is needed during this first phase. After that, a lower suction capacity is needed.
For the Scrubber Unit and for the Flow Regulator, the times for 'HIGH' and 'LOW' flow are programmed in the Controller.

- Press TIME, and when holding TIME press RUN/STOP. The display shows:

```
EXHAUST PARAMETERS
*HIGH=YY    LOW=ZZ
```

The * indicates that the 'HIGH' flow will be set first.

- Press ▲▼ to choose the time in minutes for 'HIGH' flow. Max 180, Min 0
- Press RUN/STOP to confirm set time for 'HIGH' flow.
- Press ▲▼ to choose the time in minutes for 'LOW' flow. Max 59 , Min 0

Note! The time set for "LOW" is the time where the "LOW" flow remains after that the digestion is finished. In this way unnecessary emission of fumes during the cooling phase can be prevented.

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- Press RUN/STOP to confirm and store the chosen times and the Controller returns to the working menu:

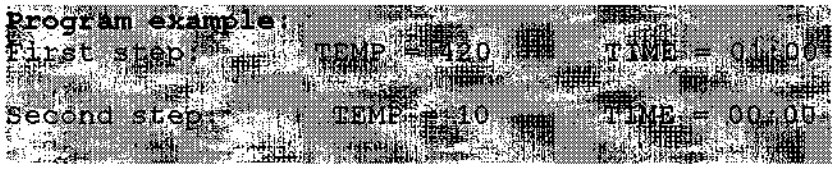
```
#:1   T: XXX    YY:YY
STOP     ZZZ
```

4.5.6 Lift System connected

The Lift System is started when the temperature programmed for the start step is reached in the Digestor. The tube rack with the tubes moves up and docks with the exhaust manifold or the reflux head. The complete assembly is lowered into the block and the digestion proceeds for the programmed cycle.

Note! When DS-40 is used, it is preferable to dock the exhaust manifold or the reflux head manually.

The Lift stop signal comes when the Controller reaches a step where the time is set to 00:00. The complete assembly will then be raised to its top position.



- When the temperature in the Digestor has reached 420°C, the complete assembly will be lowered into the Digestor.
- After 1 hour, step number two is activated, and as the time is 00:00, the complete assembly will rise in the Lift system.
- The Digestor will cool down to room temperature when the temperature is set to 10.
- A step when the time is set to 00:00 is called a stop step. In this step the Digestor will maintain the set temperature.
- You can reach a stop step in a cycle or choose a step with time 00:00, and press run.

4.5.7 Interrupting the cycle

The cycle can be interrupted by pressing RUN/STOP. The tube rack with the Exhaust Manifold or the Reflux Head will rise to the top position in the lift and the flow will continue through the Flow Regulator or Scrubber Unit for the programmed time.

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If some button other than RUN/STOP is pressed, the Flow Regulator or Scrubber unit will stop immediately.

By pressing RUN/STOP, the tube rack and the Exhaust Manifold or Reflux Head will be lowered into the digestor, and the cycle will continue from the beginning of the step where it was interrupted.

Note! If the power supply is interrupted, The Controller beeps and a warning will be shown in the display:

```
CYCLE HALTED DUE TO
POWER INTERRUPTION
```

For a combination with Controller, Lift System, scrubber Unit and Digestor the following happens:

If the power supply is interrupted during an unattended digestion the tubes will remain in the block and the block will cool off. When power comes back, the Lift System will lift the tubes out of the block and remain in that position until manual action is taken and the block will not start to heat. The Scrubber Unit will start with reduced suction for the programmed time.

4.5.8 Example of Digestion with Flow Regulator or a Scrubber Unit

Note! When the Flow Regulator or the Scrubber Unit is connected to a Controller the switch must be in the 0-position.

With Lift

Settings for the Flow Regulator or the Scrubber Unit in the Controller:

```
EXHAUST PARAMETERS
*HIGH=10   LOW=15
```

The digestion time is set at 01:00
After the RUN/STOP button has been pressed to start the digestion cycle and the Digestor has reached the set temperature, the Lift will lower the complete assembly into the Digestor. At the same time the Flow Regulator or the Scrubber Unit starts the 'HIGH' flow, which continues for 10 minutes. The remaining digestion time will have a 'LOW' flow. After the digestion is completed, the Lift will raise the complete assembly to the top position. The 'LOW' flow will continue for 15 minutes.

Without Lift

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Settings for the Flow Regulator or the Scrubber Unit in the Controller:

```
EXHAUST PARAMETERS
*HIGH=10  LOW=15
```

The digestion time is set at 01:00
When the Digestor has reached the set temperature, the Flow Regulator or the Scrubber Unit starts at a 'HIGH' flow, that will continue for 10 minutes. The tube rack is then lowered manually into the block. After the 10 minutes have passed, the flow will continue with a 'LOW' flow for the rest of the digestion time. When the remaining digestion time has passed, the tube rack must be lifted out from the Digestor manually, and the 'LOW' flow continues for 15 minutes.

4.5.9 Digestor finishes heating

The Digestor will stop heating when it reaches a stop step where the temperature setting is lower than the ambient temperature.

4.6 Handling of the tube rack

4.6.1 Before digestion

With Lift System

- Make sure that the rack is filled with tubes, even if not all contains a sample. Otherwise the performance of the Exhaust Manifold or Reflux Head will be impaired.
- Check that the correct timing is set for the Lift System or for the Controller Unit.
- Regulate the vacuum/flow rate for the Exhaust Manifold/Reflux Head during the digestion as described in the application that is performed.
- When using the Reflux Head make sure that the cooling capacity is enough.
- Start the Lift System.

Without Lift System

- Place the Exhaust Manifold or the Reflux Head on top of the digestion tubes. Make sure that the rack is filled with tubes, even if not all contains sample. Otherwise the performance of the Exhaust Manifold or Reflux Head will be impaired.
- Place the whole rack in the Digestor.
- Regulate the suction of the Exhaust Manifold/Reflux Head to what is required for the application being performed.

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- When using Exhaust caps place the cap on top of the digestion tube. To have the most effective exhaust, each cup should be placed on a tube, even if the tube does not contain any sample. Alternatively insert a rubber plug in the unused caps.

Note! If the airflow through the Exhaust Manifold or Exhaust caps is too high, there is a risk of evaporating acid and/or reagent. This may cause a loss of nitrogen or of the parameter being analysed.

4.6.2 After digestion

With Lift System

- After the programmed time is over, the tube rack with Exhaust manifold rises to cooling position.
- To prevent acid from dripping onto the Digestor, the drip tray should be in place before removal of a rack, when no digestion is being performed.

Without Lift System

- When the digestion is complete, lift the tube rack out, with the Exhaust Manifold still in place, and put it on the optional cooling stand or onto a heat resistant material. For rapid cooling, a small fan may be used.
- After the cooling, place the Exhaust manifold onto the stand (including the drip pan) to prevent acid from dripping onto the surface underneath. Turn off the water tap.

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5 MAINTENANCE

5.1 Cleaning of the Digestion tubes

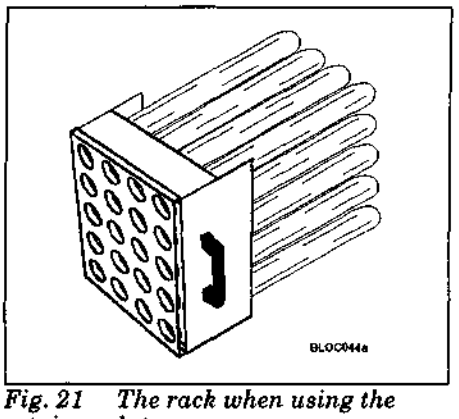

Fig. 21 The rack when using the retainer plate.

Fig.21 shows how the digestion tubes can easily be cleaned and dried in the rack by using the retainer plate.

a) Place the tube rack with the tubes on the bench.

b) Elevate the tube rack so that it touches the upper part of the tubes.

c) Hook the retainer plate over the rims of the tubes and attach it to the upper part of the stand.

The whole tube rack with tubes can now be turned upside-down and cleaned with water through a piece of tubing connected to a water tap. Or it may be placed in a laboratory dishwasher.

5.2 Maintenance

5.2.1 Digestion system

The Digestion System requires very little maintenance apart from the daily wiping off of any acid drops from the unit itself.

5.2.2 Exhaust system

The Exhaust manifold can be rinsed from acid by filling the plastic drip pan (supplied with the Exhaust system) with water.

- Open the water tap for the aspirator fully and immerse the caps of the Exhaust Manifold in the water. The water will then be sucked through the caps.
- Let the manifold dry before the next digestion. Also make sure that no water is left in the tubing.
- Open the water tap fully and raise the manifold for some seconds.

This procedure should be done at regular intervals to keep the system in good function.

5.2.3 Scrubber Unit 2001

The reagents in the flasks must be exchanged when they are exhausted, i.e. when the pH of the alkali solution is too low (pH<7). A cleaning of the two flasks shall be made at regular intervals, i.e. 100 digestions. Fill

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the flask with water and dissolve all crystals. Repeat the procedure two to three times.
To obtain best performance the seals in the flasks should be greased with regular vacuum grease.

5.2.3.1 Pre-cleaning stage

The flask to the left should be filled to the minimum level with water. The water traps acidic fumes there by increases the useful life of the reagents in the scrubbing stage.

5.2.3.2 Cleaning air pump

It is normally not necessary to clean the air pump unless the neutralising flask accidentally has been filled above the maximum level and liquid has been sucked into the air pump. If this happens it will not cause permanent damage to the pump but it has to be cleaned.

To clean the air pump proceed as follows:

1. Disconnect the Scrubber from the power supply.
2. Remove both flasks.
3. Connect a hose from the air outlet on the rear to a sink.
4. Gently rinse the pump with water through the rightmost nipple on the front of the unit, i.e. outlet of the neutralising flask.

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6 TROUBLE SHOOTING SCHEME

Digestion systems		
Fault	**Probable cause**	**Corrective measure**
Lamp in main switch lit up but not the display.	The temperature cut-out thermostat.	Try to restore the cut-out thermostat or contact your service engineer.
The display shows a very low value for two minutes ,then shows one zero in the middle.	The temperature transmitter is broken.	Contact your service engineer to replace the temp transmitter.
The display first shows nothing, then one zero in the middle.	The temperature has exceeded 450°C.	Restore by turning off and on again.
The display does not show the set temperature the first second after power but shows 100°C instead.	The EE-prom is broken.	Contact your service engineer to replace the circuit board.
The lamp in the main switch and the display lights up but the digestor does not get hot.	The semiconductor relay or the rod heater or a connection problem.	Check the cables or contact your service engineer.

Controller		
Fault	**Probable cause**	**Corrective measure**
The Controller does not start.	Connection problem.	Check the cables.
The unit beeps at intervals of one sec.	Program fault	Change unit.
The unit does not remember the last set value.	The EE-prom is broken.	Contact your service engineer to replace the circuit board.
The function keys get stuck.	The circuit board is broken.	Contact your service engineer to replace the circuit board.

Flow Regulator		
Fault	**Probable cause**	**Corrective measure**
The unit does not react to the control signals.	Connection problem.	Check that the water tap is turned on and check the cable.

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7 TECATOR APPLICATION NOTES SYSTEM

For information about preparation of chemicals and the Fibertec method please see the Application Note AN 300 supplied with your system.

In Tecators extensive list of Application Sub Notes you will find information on how to analyse the sample of your choice. Please contact your Tecator representative for more details.

tecator

APPLICATION SUB NOTE

THE DETERMINATION OF NITROGEN ACCORDING TO KJELDAHL IN CEREALS

Sample Preparation

Grind the samples by using a suitable laboratory mill (Tecator Cyclotec) or grinder (Tecator Knifetec Mill). Weigh 1 g of sample to an accuracy of ± 0.1 mg into a 250 ml digestion tube.

Digestion

Add 2 Kjeltabs Cu 3.5 (or 7 g K_2SO_4 + 0.8 g $CuSO_4$ x $5H_2O$). Add 12 ml concentrated H_2SO_4. Shake gently to "wet" the sample. Position the exhaust and turn on aspirator or scrubber. Digest for 60 minutes. Remove rack with exhaust and leave to cool for at least 15 minutes.

Distillation

On some systems part or all of this is performed automatically. Dilute cooled digest with 75 ml H_2O. Add 25 ml of receiver solution to receiver flask. Add 50 ml 40 % NaOH to diluted digest. Allow reaction to settle (delay). Distil for the prescribed time (see below) and titrate distillate with standardised titrant*.

*The normality of the titrant is required to 4 decimal places. Perform a reagent blank before each batch of samples.

Calculation

$$\% \text{ Nitrogen} = \frac{(T-B) \times 14.007 \times N \times 100}{\text{Weight of sample (mg)}}$$

% Protein = % Nitrogen x 6.25 (5.7 for wheat)

T = Sample titration B = Blank titration N = Normality of titrant

Settings

For details see system manual. Preheat Digestion Block to 420° C. Adjust exhaust to just contain fumes after 5 minutes at full effect.

Model	Dilution	Alkali	Delay	Distil	Rec. Soln.	Titrant
1002	75 ml	1stroke	--	4 mins	4% H_3BO_3	0.1 N HCl
1026	75 ml	2	02	3.6	4% H_3BO_3	0.1 N HCl
1030	75 ml	Macro	Auto	Auto	1% H_3BO_3	0.1 N HCl
1035	75 ml	50 ml	12 sec	Auto	1% H_3BO_3	0.1 N HCl

Fig. 22 Example of an Application Sub Note.

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8 TECHNICAL SPECIFICATION

8.1 Safety

The insulation of external, inaccessible circuits is reinforced.

8.2 Environmental conditions

The equipment is designed to be safe at least under the following conditions:

- Indoor use
- Altitude up to 2000 m.
- Temperature 5° C to 40° C.
- Maximum relative humidity 90% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.
- Mains supply voltage fluctuations not exceeding ±10% of the rated voltage.
- Transient overvoltage category is II which is normal for this type of equipment.
- Pollution degree 2.

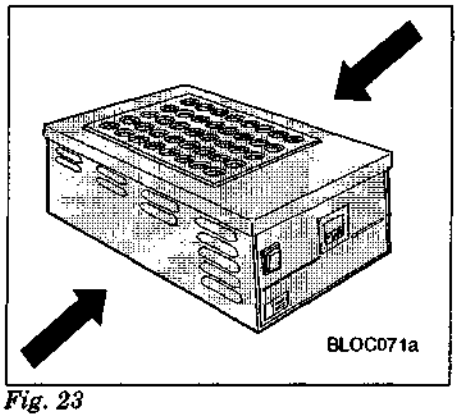

Fig. 23

8.3 Storage and transport

Lift the instrument 2020 and 2040 Digestor according to figure 23. Weight 19 kg.

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9 SALES AND SERVICE

9.1 Complete Digestion system

Tecator's Digestion Systems are easily expandable to meet future needs by adding suitable components from the list below.

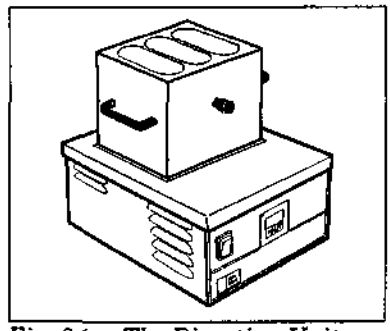

Fig. 24 The Digestion Unit.

Digestion units:

	Equipped with a built-in electronic temperature control 100°- 440°C and digital display. As standard, all are prepared for the 2000 Controller and complete with tube rack, heat shields and washing plate.
2006-001	Digestor for up to 6 test tubes, size 250 ml.230 V, 50-60 Hz.
2006-002	Same as above but for 115 V, 50-60 Hz.
2012-001	Digestor for up to 12 test tubes, size 100 ml. 230 V, 50-60 Hz
2012-002	Same as above but for 115 V, 50-60 Hz
2020-001	Digestor for up to 20 test tubes, size 250 ml. 230 V, 50-60 Hz.
2040-001	Digestor for up to 40 test tubes, size 100 ml. 230 V, 50-60 Hz.

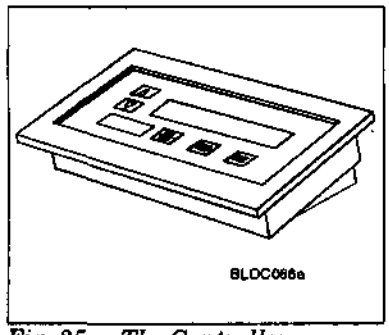

Fig. 25 The Controller.

Control Systems :

2000-001	Controller with nine programmable temperatures, 50°- 440°C, and time steps. May be used in combination with any of the Digestors. Powered from the Digestor.
2000-013	Scrubber Interface. 230V, 50-60 Hz. Allows the 1013 Scrubber Unit to be operated by the Controller.

Lift Systems :

	As standard, all are prepared for the 2000 Controller
2015-020	Lift System complete with accessories for the 2020 Digestor, 230 V, 50 Hz
2015-021	Same as above but for 60 Hz
2015-040	Lift System complete with accessories for the 2040 Digestor, 230 V, 50 Hz
2015-041	Same as above but for 60 Hz

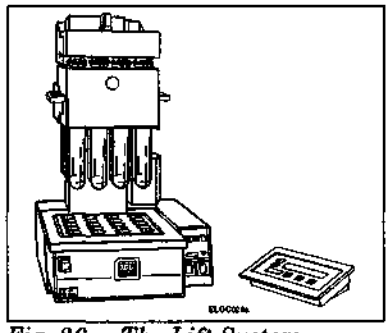

Fig. 26 The Lift System.

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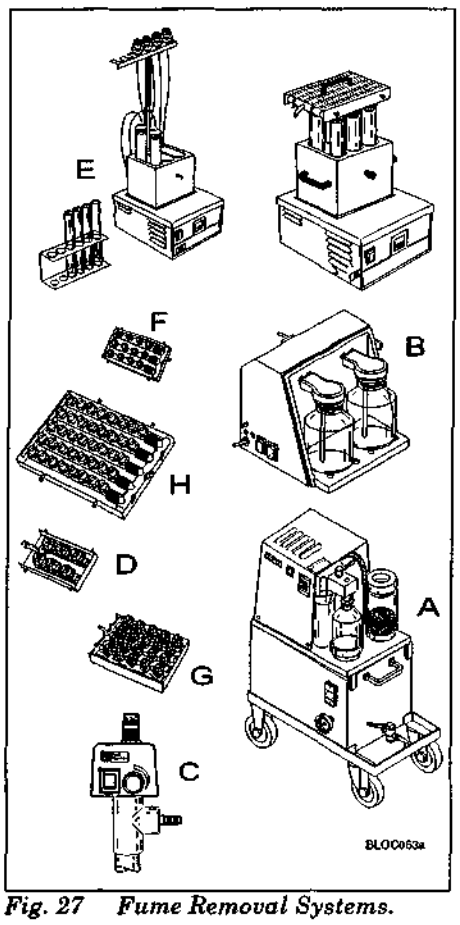

Fig. 27 Fume Removal Systems.

Fume Removal Systems :

1013-101	A	Scrubber Unit 230 V, 50-60 Hz for neutralization of fumes in Kjeldahl digestions. It can be combined with any of the Exhaust Systems. Up to two Digestors can be connected to one Scrubber Unit. For automatic operation by the Controller, use the 2000-013 Scrubber Interface.
2001-001	B	Bench top Scrubber unit 100/110/200/230 V, 50-60 Hz for neutralization of fumes in acid digestions. It can be combined with any of the Exhaust Systems. Up to 100 samples without replenishing reagents. Fully automatic operation obtained by using the Controller 2000.
2000-010	C	Flow Regulator. 230 V, 50-60 Hz. Depending on the position of the switch, the water flow is "HIGH","LOW" or "STOP". When connected to the Controller, this is done automatically.
2000-011	C	Same as above but for 115 V.
2006-020	D	Exhaust System for the 2006 Digestor, complete with water aspirator
2006-021	E	Same as above but designed for easy handling of each individual tube, complemented with a special tube rack for this purpose.
2012-020	F	Exhaust System for the 2012 Digestor, complete with water aspirator
2020-020	G	Exhaust System for the 2020 Digestor, complete with water aspirator **
2040-020	H	Exhaust System for the 2040 Digestor, complete with water aspirator **

** Can easily be mounted on the Lift System

Note! All the Exhaust Systems are prepared for connection to the 2000-010 Flow Regulator.

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9.2 Accessories and spare parts

Test Tubes :

Straight model (fig. A), often used for Kjeldahl determination.

1000-0155	Size 250 ml, set of 6
1000-0158	Same as above, but set of 20
1000-0825	Size 100 ml, set of 12
1000-0735	Same as above, but set of 40

With constriction and volume mark (fig. B), used in applications where the digest is diluted to volume and an aliquot is taken for tests.

1000-0154	Volume mark at 250 ml, set of 6
1000-0157	Same as above, but set of 20
1000-0826	Volume mark at 100 ml, set of 12
1000-0737	Same as above, but set of 40

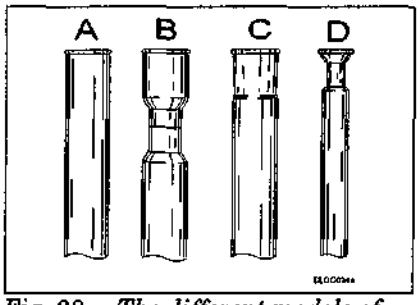

Fig. 28 The different models of test tubes.

With a ground joint (fig. C) for air-cooled reflux condensers

1000-0156	Size 250 ml, set of 6
1000-0159	Same as above, but set of 20

With a ball joint (fig. D) for water-cooled reflux condensors

1000-0610	Size 250 ml, set of 6
1000-0611	Same as above, but set of 20
1000-0627	Size 100 ml, set of 12
1000-5523	Same as above, but set of 40

Reflux Condensors:

2006-030	Reflux head with 6 water-cooled condensors for 250 ml tubes
2012-030	Reflux head with 12 water-cooled condensors for 100 ml tubes
2020-030	Reflux head with 20 water-cooled condensors for 250 ml tubes ***

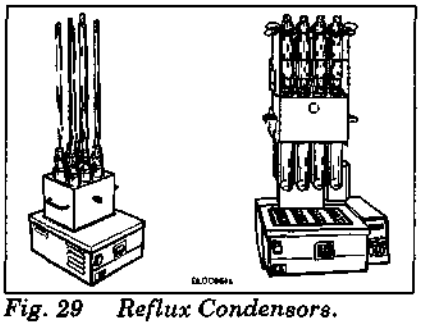
Fig. 29 Reflux Condensors.

*** Can easily be mounted on the Lift System

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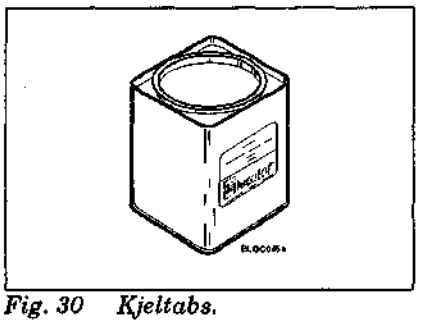

Fig. 30 Kjeltabs.

Kjeltabs : *All types are delivered in boxes of 1000.*

1527-0003	Selenium, tablets with 3.5 g K_2SO_4 + 3.5 mg Se.
1527-0004	Mercury, tablets with 3.5 g K_2SO_4 + 175 mg HgO
1527-0018	Copper, tablets with 3.5 g K_2SO_4 + 400 mg CuO x 5 H_2O
1527-0001	Selenium, tablets with 1.5 g K_2SO_4 + 7.5 mg Se.
1527-0033	Mercury, tablets with 1.5 g K_2SO_4 + 75 mg HgO
1527-0034	Copper, tablets with 1.5 g K_2SO_4 + 150 mg CuO x 5 H_2O

Handling Systems:

One each of the listed items below is included in the corresponding Digestor. For handy operation it is advisable to order more Tube Racks so that all the tubes normally in use in the laboratory are placed in a rack.

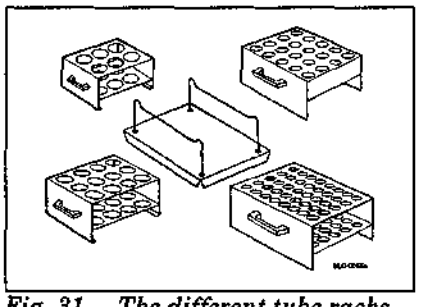

Fig. 31 The different tube racks and the stand for rapid cooling.

1000-0831	Tube rack for 6 tubes, 250 ml
1000-0573	Tube rack for 12 tubes, 100 ml
1000-4237	Tube rack for 20 tubes, 250 ml. This rack fits the 1038 Sampler.
1000-0072	Tube rack for 40 tubes, 100 ml
1000-0536	Heat shields for the tube racks with 6 or 12 test tubes.
1000-0188	Heat shields for the tube racks with 20 or 40 test tubes.
1000-0538	Retainer plate for simultaneous washing and drying of 12 tubes in their rack.
1000-4424	Retainer plate for simultaneous washing and drying of 20 tubes in their rack.
1000-0095	Retainer plate for simultaneous washing and drying of 40 tubes in their rack.

For convenient operation the Digestion System could be complemented with the following accessories.

1000-0012	Tube rack for individual handling of up to 6 tubes, 250 ml. Recommended for "express" samples when a 2006 Digestor is used. (Included in 2006-021).
1000-0897	Handling device for test tubes.
1000-0817	Stand for rapid cooling when racks with 6 or 12 tubes are used.
1000-0424	Stand for rapid cooling when racks with 20 or 40 tubes are used. This is not needed when the Lift System is used.
1000-0460	Boiling rod, to avoid bumping when digesting large volumes of water.

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1521-0001	Dispenser for reagents like acid or peroxide. Adjustable 1 - 10 ml, (1250).
1521-0002	Dispenser for reagents like acid or peroxide. Adjustable 10 - 30 ml, (2000).

Scrubber unit:

1000 6401	Flask
1000 6390	Lid cpl.
1000 6757	Set of o-rings
1000 6758	Membrane kit for pump cpl.
1564 0049	Fuse, T 1.6 A
1564 0073	Fuse, T 3.15 A
1564 0097	Fuse, T 2.5 A

9.3 Manufacturers name and address

Tecator AB
Box 70
S-263 21 Höganäs
Sweden

Int phone. +46 42 361500
Int fax. +46 42 340349

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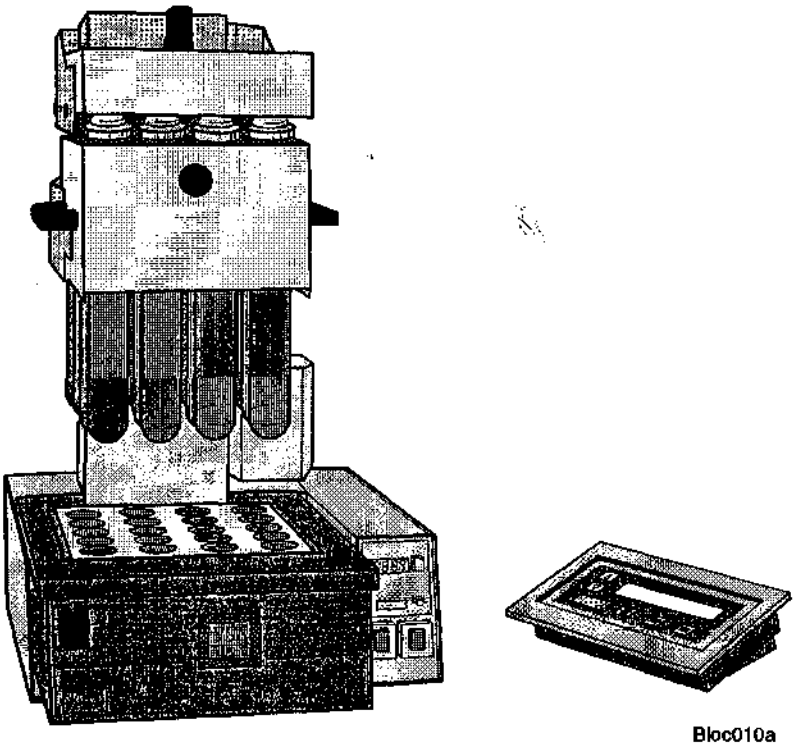

Bloc010a

2015/1015
LIFT System

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Lift, Instruction Manual, Rev. 2.0 11/95 Part no 1000 5221, Tecator AB, Sweden

1 SAFETY PRECAUTIONS AND PROCEDURES

1.1 Intended use

The 1015/2015 Lift Unit is designed for laboratory use analysing parameters as specified in Tecator's Application Notes.

Caution!

The responsible body shall be made aware that, if the equipment is used in a manner not specified by the manufacturer,the protection provided by the equipment may be impaired

1.2 Safety precautions:

Please read these operating instructions carefully and act accordingly.

For safety reasons people not familiar with these operating instructions must not use the instrument.

⚠ Warning!

Careful handling of the solutions used in an analysis is mandatory for laboratory safety. Refer to the appropriate material safety data sheet for reagent handling instructions. Eye protection should be worn at all times.

⚠ Warning!

This product is provided with a power cable of special design which, if damaged, must be replaced by a cable of the same type; such cable may be obtained from Tecator AB and must be fitted by a specialist.

⚠ Warning!

This device is equipped with a grounding /earthing type power plug for your protection against electrical shock hazard and should only be attached to a properly grounded/earthed receptacle.

⚠ Warning!

Before replacing the fuses, disconnect incoming mains supply.

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⚠ Warning!

Electrical shock hazard. Covers or panel(s) should be removed by qualified personnel only.

⚠ Warning!

Modifications, alterations, rebuilding or use of safety parts not authorized by Tecator AB violates the warranty. Tecator AB has no responsibility for damages, material or personal, occurring as a result of such actions.

2 INTRODUCTION

The 2015/1015 Lift System, in conjunction with Tecator digestion blocks DS-20 or DS-40, enables a highly automated digestion procedure to be performed while minimizing the need to handle heavy tube racks containing hot corrosive acids. The built-in programmable controller ensures precise and repeatable digestion conditions without the presence of an operator.
The 2015/1015 Lift System accommodates both the standard Exhaust Manifold and the water-cooled Reflux condensors which are accessories to the DS-20 and DS-40 digestion blocks. This enables automated reflux techniques, such as C.O.D., as well as acid digestions. This is particularly useful for water laboratories, for example, which need to perform both Kjeldahl Nitrogen and C.O.D. on many of their samples. The Lift System together with a reflux head also enables an automatic preparation of samples prior to analysis by Automatic Absorption or Continuous Flow instrument.

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3 PREPARATIONS FOR USE

3.1 Unpacking and checking

Unpack the Lift system with care.
Note!
Use the packing list enclosed with the equipment to ensure that no parts are missing. If you have any questions, please contact your Tecator representative or:

Tecator AB
Address at rear cover.

3.1.1 Main parts

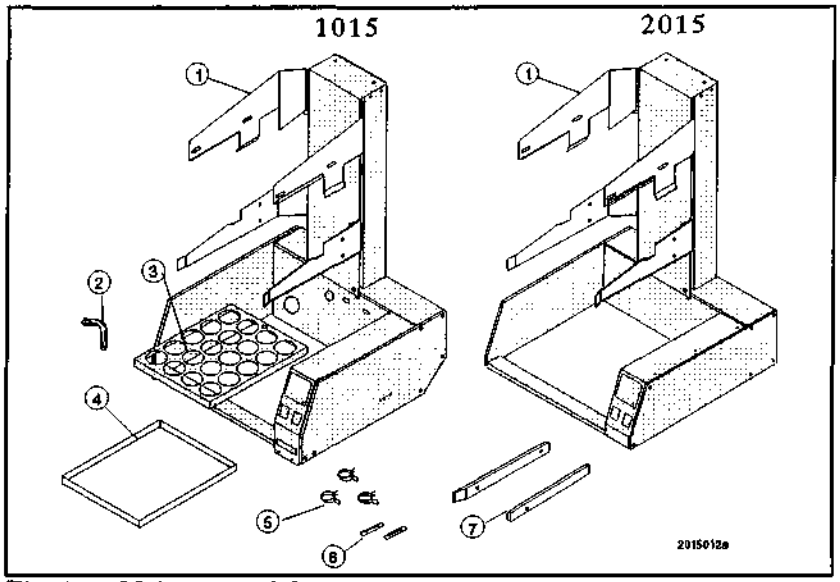

Fig. 1 Main parts of the system
1. Lift system 2015 / 1015
2. Tubing bend (only 1015)
3. Guide plate (only 1015)
4. Drip pan
5. Spacer (only DS40 Digestion block)

3.2 Assembly / Installation

Place the Lift System in a fume cupboard or on a laboratory bench with access to suitable power, water and drainage.

3.2.1 Tubing (Only 1015 LIFT SYSTEM)

The tubing bend (see Fig. 2 pos.1) is connected to the glass exhaust nipple with the tubing provided (see Fig. 2 pos. 2).

Note! Mount the short end of the tubing bend towards the exhaust manifold.

- Connect the tube from the water aspirator to the the tubing bend.

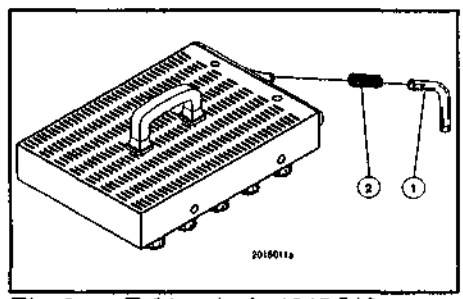

Fig. 2 Tubing (only 1015 Lift system)

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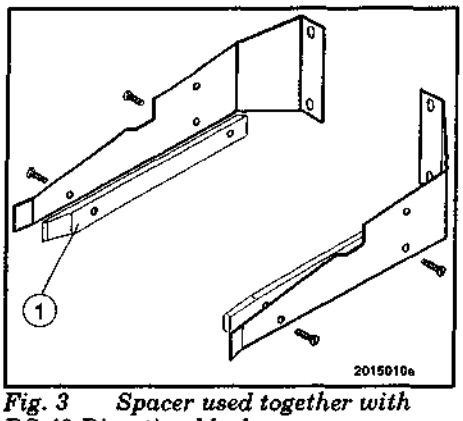

Fig. 3 Spacer used together with DS 40 Digestion block

- Turn the tubing bend so that it points to the side where the water aspirator is located.
- Secure the tubing clamps.
- Hang the tube on one of the hooks on the wings.
- Shorten the tubing as much as possible to minimize the length between the exhaust manifold in the upper position and the water aspirator. This prevents drain traps.
- Connect the other end of the tubing to the water aspirator, or to the Scrubber.

3.3 Spacer When DS 40 is Used

- Mount the spacer (see Fig. 3 pos.1) so that the bevel is facing away from the Lift. Tighten the screws.

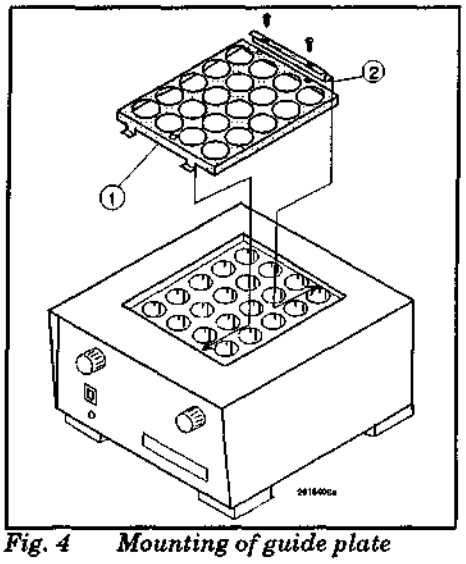

Fig. 4 Mounting of guide plate

3.4 Mounting the Guide Plate (Only 1015 Lift System)

- The guide plate (see Fig. 4 pos.1) is assembled so that the angle iron (pos. 2) on the guide plate is placed at the rear of the opening on the cover of the block.
- Hold the guide plate a little above the block and place the angle iron on the guide plate.
- Position the angle iron so that it can hook under the cover of the block at the front. Tighten the screws to secure the iron angle to the guide plate.
- Use a rack loaded with tubes to check that the tubes move freely into and out of the holes in the block. If necessary, adjust the postion of the guide plate.

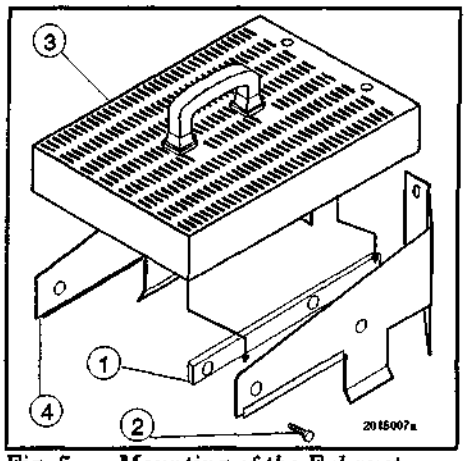

Fig. 5 Mounting of the Exhaust manifold

3.5 Mounting the Exhaust Manifold

- Mount the exhaust manifold (see Fig. 5 pos.3) between threaded plates (pos. 1) and the wings (pos.4) using the knurled screws (see pos.2).
- Check, with a rack loaded with tubes, that the tubes move freely.
- Tighten the knurled screws.

Note! Before connecting the grounded power supply, make sure that the mains voltage in the laboratory agrees with that stated on the back of the unit.

Lift, Instruction Manual, Rev. 2.0 11/95 Part no 1000 5221, Tecator AB, Sweden

3.5.1 Exception

If an Exhaust Manifold from the 1000 series is going to be used with Digestion block and Lift System from the 2000 series, the Exhaust Receiver must be as shown in Figure 6.

Part to be changed:
Exhaust Receiver to DS 20 Part no. 1000 0261.
Exhaust Receiver to DS 40 Part no. 1000 0693.

Or complete Exhaust Manifold:
DS 20 Part no. 2020-020
DS 40 Part no. 2040-020

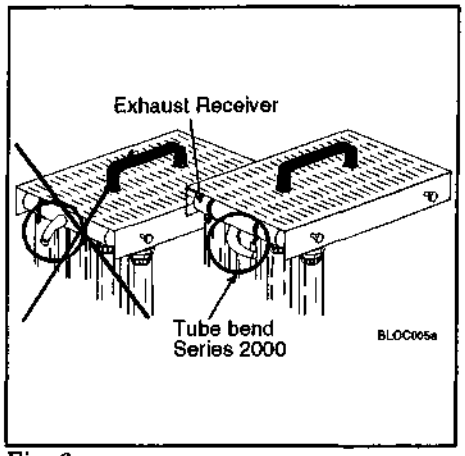

Fig. 6

3.6 Operation

- Make sure the system is conncted to the appropriate power supply.
- Switch on the POWER (see Fig. 7 pos.7) to the Digestor as well as the Lift (see pos.1). Wait until the block reaches working temperature.
- Place a rack of tubes on the wings, and adjust the water aspirator to the maximum flow. Alternatively connect the scrubber and adjust the flow according to the operator's manual.
- Turn the knob marked -/+ (see Fig. 7 pos.4) to program the desired digestion time in hours and minutes.

Note! For times up to one hour, the time intervals are in minutes. For times greater than one hour, the time intervals are in ten-minute steps.

- Press the START-STOP button (see Fig. 7 pos.3). The tube rack with tubes moves up and docks with the exhaust manifold (or reflux head). The complete assembly now moves down into the block and the digestion proceeds for the programmed time.
- When the digestion has proceeded for about five minutes, or the dense white fumes have subsided, adjust the exhaust flow rate just enough to contain the remaining fumes within the manifold. Too much suction will cause acid losses and potential loss of nitrogen.
- After the preset time, the tube rack together with the exhaust manifold (or reflux head) still connected will rise to the cooling position.
  An audible signal indicates that the digestion cycle is over.
- Press the button marked ↑↓ (see Fig. 7 pos.2). The tube rack and the exhaust manifold are separated and the rack can be removed from the Lift.

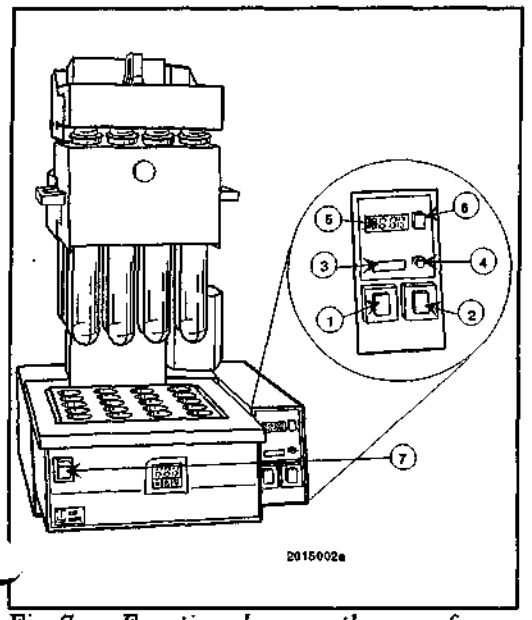

Fig. 7 Functions keys are the same for the both Lift systems
1. ↑↓ button
2. Main switch
3. START-STOP button
4. -/+ knob
5. Display
6. Clock switch
7. Main switch on the Digestion block

Note! To prevent acid from dripping on the Digestion Block, the drip tray should be placed under the exhaust head BEFORE the tube rack is removed.

Note! Adjustment of the exhaust flow rate does not apply when a Reflux head is used. Check instead that the cooling water is flowing satisfactorily.

3.6.1 Setting the Internal Clock

- Press the main switch (see Fig. 7 pos.1) to switch on the Lift.
- Push and hold the button (see Fig. 7 pos.6) and turn the -/+ knob (see pos.4) until the correct time is shown in the display (see pos.5).

3.6.2 Interrupting the Cycle

3.6.2.1 Changing the digestion time

- Press the START - STOP button (see Fig. 7 pos.3) when the tube rack is in the lower position, then the rack together with the exhaust manifold will move to the cooling position.
- The time for digestion can now be changed by using the -/+ knob (see Fig. 7 pos.4).
- The rack and exhaust will return to the block when the START - STOP button is pressed again.

3.6.2.2 Removing the rack

- Press the START - STOP button (see Fig. 7 pos.3). The rack and the exhaust manifold will move to the cooling position.
- Separate the rack from the exhaust manifold by pressing the ↑↓ button (see Fig. 7 pos. 2).

3.7 Maintenance

To prevent acid from dripping onto the Digestion block, the drip tray should <u>always</u> be in place before removal of a rack, <u>even</u> when no digestion is performed.

All spillages should be removed immediately from all surfaces to avoid damage to your units.

Caution!

Safety gloves, eye protection and a properly fitting labcoat should be worn at all times.

4 TECHNICAL SPECIFICATIONS

4.1 Safety

The insulation of external, inaccessible circuits is reinforced.

4.2 Environmental conditions

The equipment is designed to be safe at least under the following conditions:

- Indoor use
- Altitude up to 2000 m.
- Temperature 5° C to 40° C.
- Maximum relative humidity 90% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.
- Mains supply voltage fluctuations not exceeding ±10% of the rated voltage.
- Transient over voltage category is II which is normal for this type of equipment.
- Pollution degree 2.

4.3 Technical Data / Installation Requirements

Power supply	200 - 230 V, 50 or 60 Hz
Power consumption	60 W
Water supply: 2020/2040 Exhaust system	~10 l/min for 5 min, then 2-6 l/min
Weight	24 kg
Dimensions, L x D x H	43 x 46 x 68 cm
Recommended bench space, L x D x H	43 x 56 x 68 cm

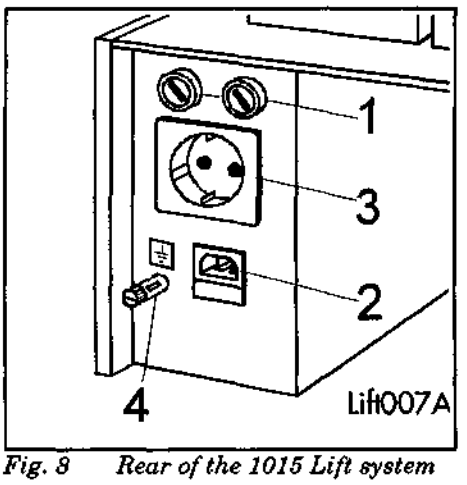

Fig. 8 Rear of the 1015 Lift system

4.4 Connectors and Fuses

Table below refers to Fig. 8 and 9

1	Fuse, T 1.6 A
2	Mains power inlet
3	Power outlet, only to be used by the Digestion block
4	Eqvipotential connector
5	Connector to the Flow Regulator / Scrubber unit

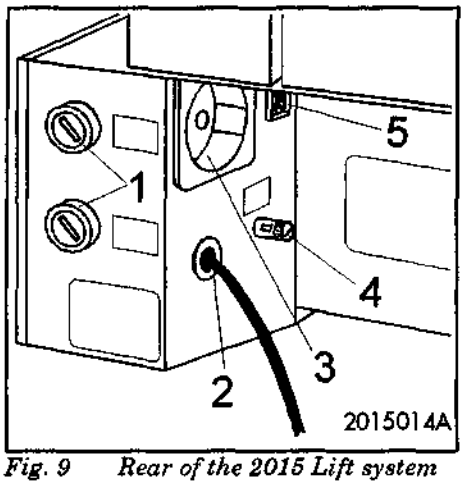

Fig. 9 Rear of the 2015 Lift system

Lift, Instruction Manual, Rev. 2.0 11/95 Part no 1000 5221, Tecator AB, Sweden

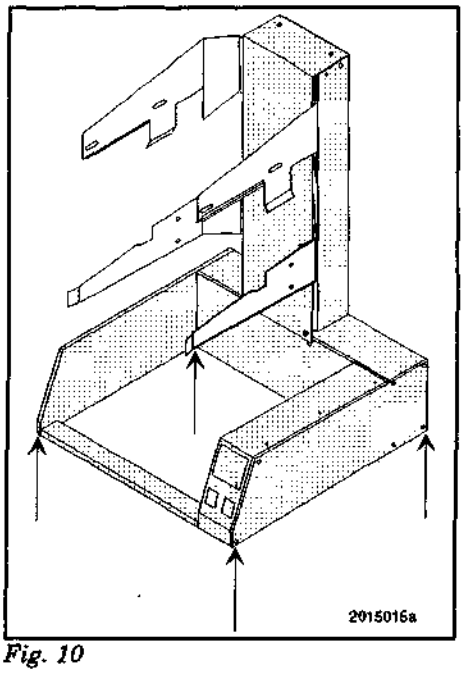

Fig. 10

4.5 Lifting the instrument

The instrument can be lifted by two persons. No specific lifting handles needed. Arrows shows the lifting points, see Fig. 10.

4.6 Storage & Transport

Repack the instrument with the original packing material to protect it.

Lift, Instruction Manual, Rev. 2.0 11/95 Part no 1000 5221, Tecator AB, Sweden

5 ACCESORIES

5.1 Spare parts

1000 7040	Power cable (special design)

5.2 Fume Removal Systems

1013-010	Scrubber Unit 230V 50 - 60 Hz for neutralisation of fumes in Kjeldahl digestions. It can be combined with any of the Exhaust Systems. Up to two Digestors can be connected to one Scrubber Unit. Up to 300 samples without replenishing reagents. For automatic operation by the Controller use the 2000-013 Scrubber Interface.
2001-001	Bench top Scrubber unit 100/110/200/230V 60 - 60 Hz for neutralisation of fumes in acid digestions. It can be combined with any of the Exhaust Systems. Up to 100 samples without replenishing reagents. Fully automatic operation obtained by using the Controller 2000.
2020-020	Exhaust System for the 2020 Digestor, complete with water aspirator. * *
2040-020	Exhaust System for the 2040 Digestor, complete with water aspirator. * *

** Can easily be mounted on the Lift System.

All the Exhaust Systems are prepared for connection to the 2000-010 Flow Regulator.

5.3 Test Tubes

Straight model, often used for Kjeldahl determination.	
1000-0156	Size 250 ml, set of 6.
1000-0158	Same as above but set of 20.
1000-0825	Size 100 ml, set of 12.
1000-0735	Same as above but set of 40.
With constriction and volume mark, used in applications where the digest is diluted to volume arid an aliquot is taken for tests.	
1000-0154	Volume mark at 250 ml, set of 6.
1000-0157	Same as above but set of 20.
1000-0826	Volume mark at 100 ml, set of 12.
1000-0737	Same as above but set of 40.
With aground joint for air-cooled reflux condensers.	
1000-0156	Size 250 ml, set of 6.
1000-0159	Same as above but set of 20.
With ball joint for water-cooled reflex condensers.	
1000-0610	Size 250 ml, set of 6.
1000-0611	Same as above but set of 20.
1000-0627	Size 100 ml, set of 12.
1000-5523	Same as above but set of 40.

Lift, Instruction Manual, Rev. 2.0 11/95 Part no 1000 5221, Tecator AB, Sweden

5.4 Reflux Condensers

2020-030	Reflux Head with 20 water-cooled condensers for 250 ml tubes.***
1000-6444	Acid trap for watercooled condenser.
1000-0254	Reflux condenser, air-cooled, 700 mm, with ground joint for 250 ml tubes.

*** Can easily be mounted on the Lift System.

5.5 Kjeltabs

All types are delivered in boxes of 1000.

1527-0003	Selenium, Tablets with 3.5 g K_2SO_4 + 3.5mg Se.
1527-0004	Mercury, Tablets with 3.5 g K_2SO_4 + 175 mg HgO.
1527-0018	Copper, Tablets with 3.5 g K_2SO_4 + 400 mg $CuSO_4$ x 5 H_2O.
1627-0001	Selenium, Tablets with 1.5 g K_2SO_4 + 7.5 mg Se.
1627-0033	Mercury, Tablets with 1.5 g K_2SO_4 + 75 mg HgO.
1527-0034	Copper, Tablets with 1.5 g K_2SO_4 + 150 mg $CuSO_4$ x 6 H_2O.

Other types are available upon request. However, those listed above represent more than 90% of the catalyst tablets used worlwide.

5.6 Handling Systems

Digestors are delivered complete with one each of the items listed below. It may be found convenient to order extra Tube Racks so that all the tubes normally in use in the laboratory are pawed in a rack.

1000-4237	Tube Rack for 20 tubes, 250 ml. This rack fits the 1038 Sampler.
1000-0072	Tube Rack for 40 tubes, 100 ml.
1000-0188	Heat Shield for the tube racks with 20 or 40 test tubes.
1000-0538	Retainer Plate for simultaneous washing and drying of 12 tubes in their rack.
1000-4424	Retainer Plate for simultaneous washing and drying of 20 tubes in their rack.
For convenience of operation the Digestion System can be supplemented with the followingarcesssones.	
1000-0897	Handling Device for test tubes.
1000-0424	Stand for rapid cooling when racks with 20 or 40 tubes are used. This is not needed when the Lift System is used.
1000-0460	Boiling Rod, to avoid bumping when digesting large volumes of water.
1521-0001	Dispenser for reagents like acid or peroxide. Adjustable 1 - 10 ml, (1250 ml).
1521-0002	Dispenser for reagents like acid or peroxide. Adjustable 10 - 30 ml. (2000 ml).

5.7 Manufacturers name and address

Tecator AB
Box 70
S-263 21 Höganäs
Sweden

Int phone. +46 42 361500
Int fax. +46 42 340349

4 ELECTRICAL DESCRIPTION

4.1 General

The 2000 Digestion System can be built to different degrees of complexity. For a discussion of this with part numbers etc. see chapter VIII in the user manual for 2000 Digestion System.

The general rule is that everything can be connected to each other except that the 2015/1015 Lift is only physically compatible with the DS20/40 Digestors.

It is the Digestor that is the heart of the system. The digestor has an internal electronic temperature regulator and is able to function by itself.

The actual temperature value of the Digestor is transfered to the Controller. The temperature rise in the Digestor can be controlled in nine temperature and time steps between 50-440°C. The Controller is powered from the Digestor.

The Controller is also capable to control the Flow Regulator, Scrubber and the performance of the Lift System.

4.2 Digestors

The 2000 Digestion System consists of two electrical types of digestors.

Type 1: Digestor DS 20/40 has all five heating rods connected in series, controlled by a solid state relay.

Type 2: Digestor DS 6/12 has the two heating rods connected in parallell also controlled by a solid state relay.

The solid state relay is controlled by the internal temperature regulator.

Temperature regulator:
1000 5240 (page B:12-B:16) (1000 5622 115V)

The Temperature regulator consists of a microcomputer system with microprocessor 80552, PROM and I/O circuits (page B:12). The actual temperature is sent from the temperature probe amplifier (page B:13) and is processed and displayed (page B:15). An EEPROM is used to remember the latest temperature chosen by the operator.

(Page B:13)
A temperature probe type J is connected to Junction JA. The signal from the probe is compared to a reference VREF1 and then amplified to 0-4 VDC. This signal ADC1 is supplied to the microprocessor.

Power supply (page B:14)

Mains is connected to junction JE, fused with F1A (T 160mA) or F1B (T 0.315 mA) on the primary side depending on the rating of the mains supplied. The voltage is stepped down, fused with F2 (T 500 A) and rectified to Vdd (15-28V). Vdd is stabilised to Vcc and supplied to the electronics.

Display (page B:15)

A simple binary to 7-seg decoder.

Output circuits (page B:16)

There are tree push buttons
SW1 set
SW2 up
SW3 down

these signals are transferred to the microprocessor.

Control of solid state relay and power to the heaters

The square wave signal PWR coming from the processor is triggering the monostable flip/flop IC 5 . The output from IC 5 is led trough the transistor T4 to output JC where the solid state relay is connected. The four green LED;s are lit when the digestor is heating.

If the PWR signal disappears the digestor will stop heating. This is also the case if a signal TEMPCTL is coming from an external Controller because this will sink pin 11 to zero level and prohibit heating.

Communication with other equipment

The communication takes place trough junction JD

1	Vdd	5	DATA for serial communication with the controller
2	GND	6	GND
3	PWM (not used)	7	TEMPCTL in
4	GND	8	TEMPCTL out

4.3 2015 Lift

Incoming mains power is diverted to mains power outlet (for the connection of the digestor) and via two fuses T 1.6 A supplied to the timer and to the step down transformer. The relay board 1000 5082 is controlling the movements of the lift and is operated either manually or automatically with the 2000 controller.

Relay Board 1000 5082

Power supply

At junction J2 (see page B:18) 2 x 24 VAC is supplied to the relay board. At the board the AC supply is divided for two purposes - motor supply and the electronics. The motor supply is fused with F1 (T 5 A). The voltage is then rectified and transfered to the motor via two relays REL 4 and REL 5.

The supply for the electronics is fused via F2 (T 630 mA) then half rectified to
V+ supply to relays
V- 0 V

After the voltage stabiliser IC2 Vcc (5,0 VDC) is supplied to the electronics.

The external signals are supplied to a PLD (Progammable Logic Device) via optocouplers. The PLD has to be supplied with a clock signal 1-5 kHz to be able to run its internal program.

4.3.1 Functional description

Conditions for the motor to move.

1. Time is entered on the system timer. (For details see the users manual)
2. Start/stop button is pressed
3. Manual switch is pressed upwards or downwards.

This causes the tube rack to move upwards and take the exhaust rack with it. When the two racks pass the upper position switch, the two racks are hooked together.

Both racks move downwards.
Digestion time start to ellapse when the rack pass the lower position switch.

4.4 Flow regulator 1000 5425

This is a water aspirator with flow control in two steps.

Two solid state realys are controlling the valve. This valve can be in three positions CLOSED, FLOW 1 and FLOW 2.
The unit is supplied with Mains voltage to the valves. Control signals are coming from the Controller unit.

4.5 Controller unit

The Controller unit consists of a CPT, a LCD display and I/O circuits for control of
- the temperature in the digestor
- the Flow Control valves
- the lift system movements

The controller is powered from the digestor via junction J2. Vdd is then stabilised to supply the contacts J4 and J5.

SW1 Up time/temp or Step depending on selection
SW2 Down time/temp or Step depending on selection
SW3 RUN/STOP
SW4 TEMP
SW5 TIME
SW6 Not used

Note! **If the digestor is set to a lower temperature value than the controller, the actual temperature in the digestor will only reach this lower value. Set the temperature value in the digestor well above the highest value choosen in the controller for the system to perform correctly!**

4.5.1 Pin configuration

The schematic to the table below, can be found on page B:22.

J1		J2		J3 & J4		J5	
1	Gnd	1	TEMPCTL	1	Scrubber I low speed (signal high)	1	LCD-DISPLAY With potentiometer R1 the LCD viewing angle can be adjusted.
2	TXD	2	TEMPCTL	2	RET. common		
3	RXD	3	DATA	3	Scrubber II high speed (signal high on both pin 1 and 3)		
4	not used	4	DATA	4	Lift Optocouplers doubled to increase current.		
5	Gnd	5	PWM, not used	5	Lift		
6	not used	6	PWM, not used	6	+ 12 V		
7	not used	7	GND				
8	not used	8	Vdd from Digestor				
9	not used						

5 FIELD SERVICE INFORMATION

5.1 Maintenace

See chapter VII "Maintenance and Service" in the user manual for 2000 Digestion System and chapter V "Maintenance" in the user manual for 2015/1015 Lift System.

5.2 Technical updates

5.2.1 New rod heaters for Digestion units 2020 and 2040

A new type of Rod Heater has been developed for the Digestion units 2020 and 2040. This have caused some further changes in the instrument which means that you are not able to use these new Rod Heater in older instruments.

Use following part numbers when order Rod Heater as a spare part:

Digestor	Prod. no	Voltage (V)	Power (W)	Serial No.	Part No.
DS-20	1015	50	500	from 4015	1000 2889
DS-20	1015	40	400	from 4015	1000 2890
DS-40	1016	50	500	from 650	1000 2889
DS-40	1016	40	400	from 650	1000 2890
DS-20	2020	52	500	from 16297	1000 5624
DS-20	2020	42	400	from 16297	1000 5625
DS-40	2040	52	500	from 100	1000 5624
DS-40	2040	42	400	from 100	1000 5625
DS-20	2020	52	500	from 16604	1000 6071
DS-20	2020	42	400	from 16604	1000 6072
DS-40	2040	52	500	from 158	1000 6071
DS-40	2040	42	400	from 158	1000 6072

5.3 Replacement instructions DS 20-40

5.3.1 Exchange of overheat protector

1. First check that the relay not has been activated. If it has, reset it by pushing the green reset button (pos 10).
2. Disconnect the Digestor from the main supply.
3. Unscrew the two screws (pos 1) holding the rim.
4. Unscrew the two nuts (pos 6) and washers (pos 7) from the guide plate and take it away.
5. Unscrew the four screws (pos 2 and pos 3) on the front panel.
6. Now you can turn the front and reach the overheat protector, the solid state relay and the PCB.
7. Disconnect the cables; from the mains switch(C), from the PCB (JE1)(B) and from the right rod heater(A) (seen from the rear).
8. Loose the rear gable by unscrewing (pos 4).
9. Take away the mica lamination (pos 12) by unscrewing the two screws (pos 5).
10. The cable to the overheat protector ends in a sensor (pos 8). The cable is fastened with a cable tie. Cut up the cable tie and pull out the sensor through the insulating.
11. Change the overheat protector and assemble in reversed order.
12. Perform a test run.

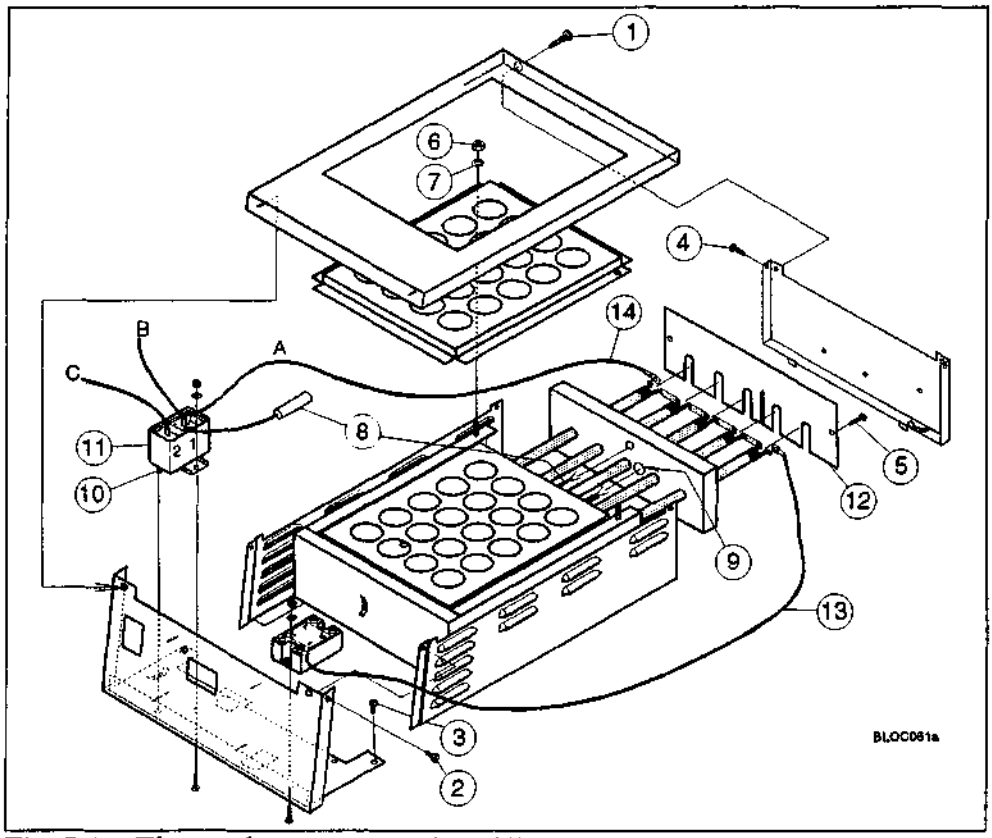

Fig. 5.1 *The overheat protector (pos 11).*

5.3.2 Exchange of solid state relay

1. Disconnect the Digestor from the main supply.
2. To get in to the Digestor follow steps 3-6 in section "Exchange of overheat protector".
3. Disconnect the cables; one from mains switch(2), two from PCB(3, white cable and 4, brown cable) and one from the left rod heater (seen from the rear).
4. Unscrew the relay and under it will be a layer of siliconpaste. (The siliconpaste carry off the heat from the relay).
5. Change the solid state relay according to fig.5.2 (put a thin layer of siliconpaste under it) and assemble in reversed order.
6. Perform a test run.

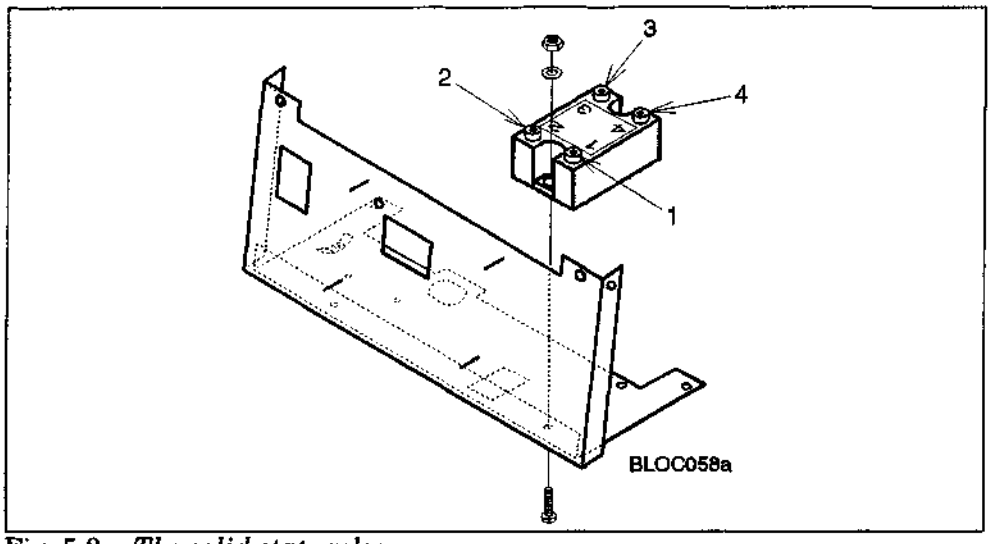

Fig. 5.2 *The solid state relay.*

5.3.3 Exchange of the circuit board

1. Disconnect the Digestor from the main supply.
2. To get in to the Digestor follow steps 3-6 in section "Exchange of overheat protector".
3. Disconnect the cables; JA1(R) and JA2(Y) the cable to the temperature sensor, JE3(PE) the cable to a receptacle in the chassie, JE1(L) the cable to the overtemperature protector, JE2(N) the cable to the mains switch, JC1(+) the white cable to the solid state relay no.3, JC2(-) the brown cable to the solid state relay no.4 and the cable to the controller.
4. Unscrew the four nuts and washers and change the circuit board.
5. Assemble in reversed order.
6. Perform a test run.

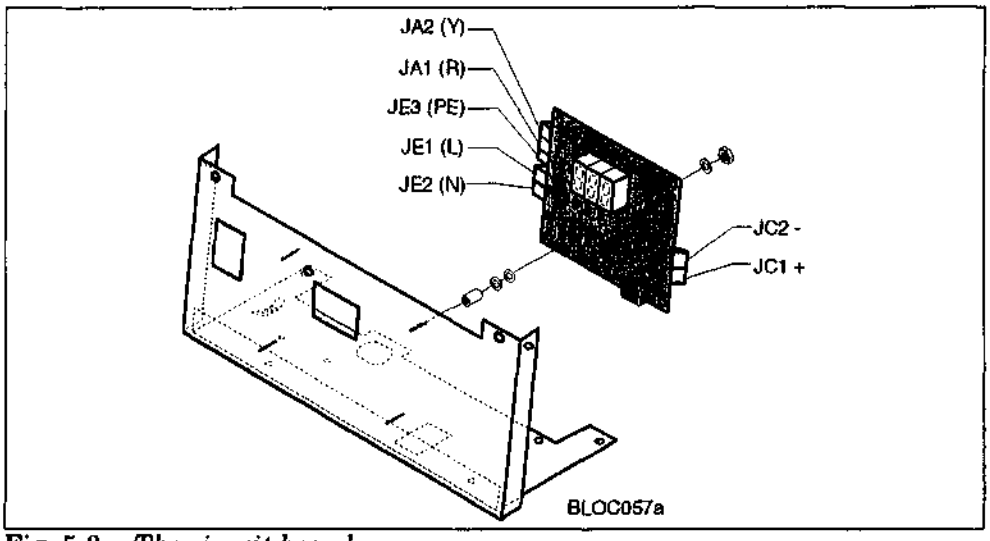

Fig. 5.3 *The circuit board.*

5.3.4 Exchange of temperature sensor

1. Disconnect the Digestor from the main supply.
2. To get in to the Digestor follow steps 3-6 in the section "Exchange of overheat protector".
3. Disconnect the two cables from the PCB; JA1(R) and JA2(Y) where the temperature sensor (pos 9) is placed.
4. Loose the rear gable by unscrewing (pos 4).
5. Take away the mica lamination (pos 10) by unscrewing the two screws (pos 5). The cable to the sensor is fastened with a cable tie. Cut up this cable tie and pull out the sensor through the insulating.
6. Change the temperature sensor and assemble in reversed order.
7. Perform a test run.

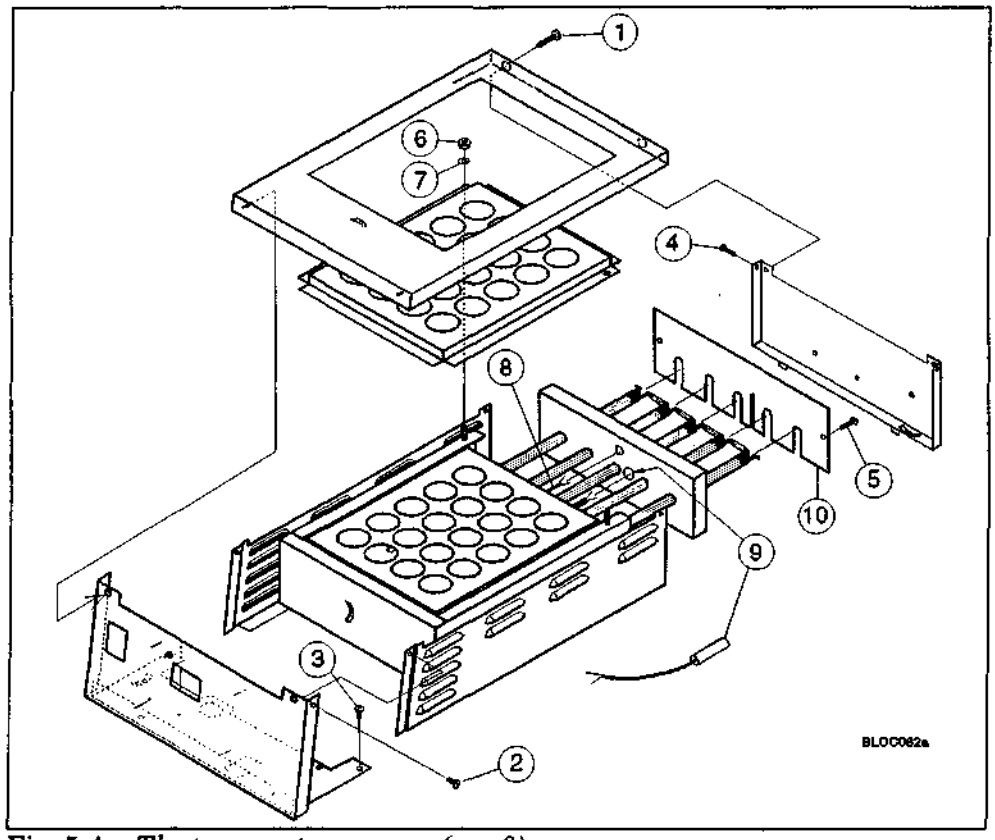

Fig. 5.4 *The temperature sensor (pos 9).*

5.3.5 Exchange of the rod heaters

1. Disconnect the Digestor from the main supply.
2. To get in to the Digestor unscrew the two screws (pos 1) holding the rim.
3. Unscrew the two nuts (pos 6) and washers (pos 7) from the guide plate and take it away.
4. Loose the rear gable by unscrewing (pos 4).
5. Take away the mica lamination by unscrewing the two screws (pos 5).
6. Loose the cables (pos 14 and 13) and the four tinplates from the rod heaters. (cable 14 comes from the overheat protector (A) and cable 13 comes from the solid state relay (no.1)).
7. Pull out the five rod heaters through the insulating.
8. Change the rod heaters and assemble in reversed order.
9. Perform a test run.

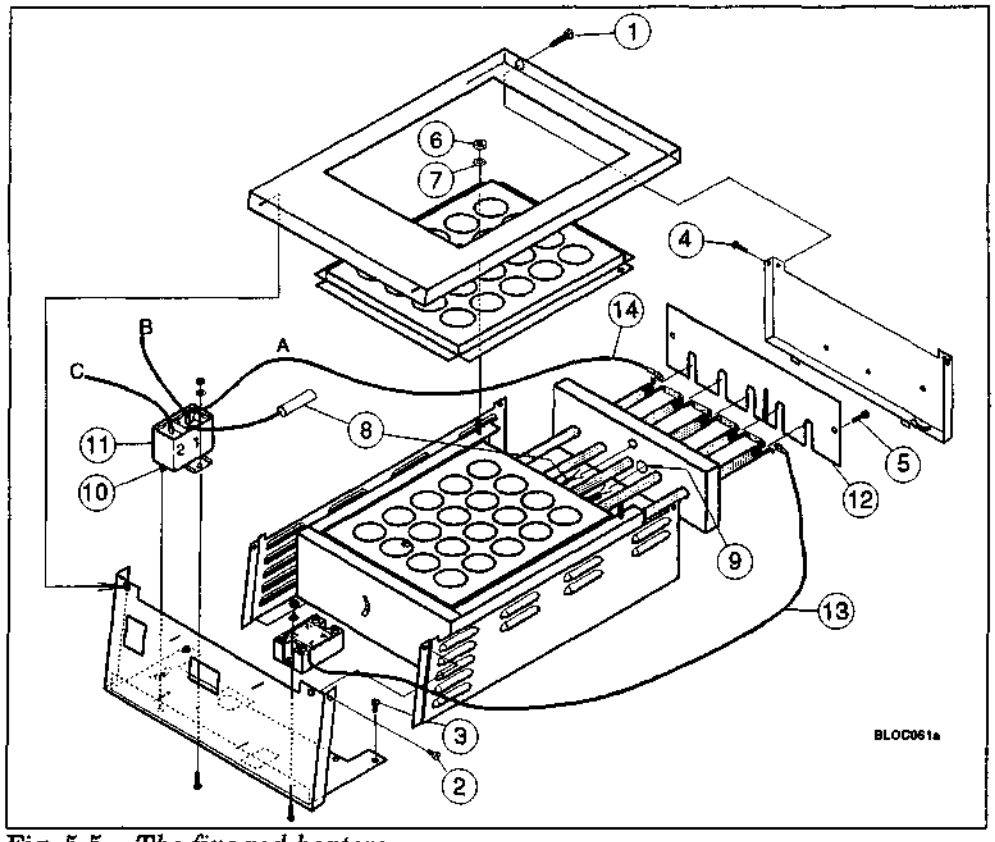

Fig. 5.5 *The five rod heaters*

5.4 Replacement instructions DS 6-12

5.4.1 Exchange of overheat protector

1. First check that the relay not has been activated. If it has, reset it by pushing the green reset button (pos 10).
2. Disconnect the Digestor from the main supply.
3. Unscrew the two screws (pos 1) holding the rim.
4. Unscrew the four feet on the underside and lift up the inner box.
5. Unscrew the two nuts (pos 4) and washers (pos 5) from the guide plate and take it away.
6. Unscrew the four screws (pos 2 and pos 3) on the front panel.
7. Now you can turn the front and reach the overheat protector, the solid state relay and the PCB.
8. Disconnect the cables; from the mains switch(D), from the PCB (JE1,L)(A) and (B and C) one from each rod heater.
9. Take away the mica lamination (pos 7) by unscrewing the two screws (pos 6).
10. The cable to the overheat protector ends in a sensor (pos 8). Pull out the sensor through the insulating.
11. Change the overheat protector and assemble in reversed order.
12. Perform a test run.

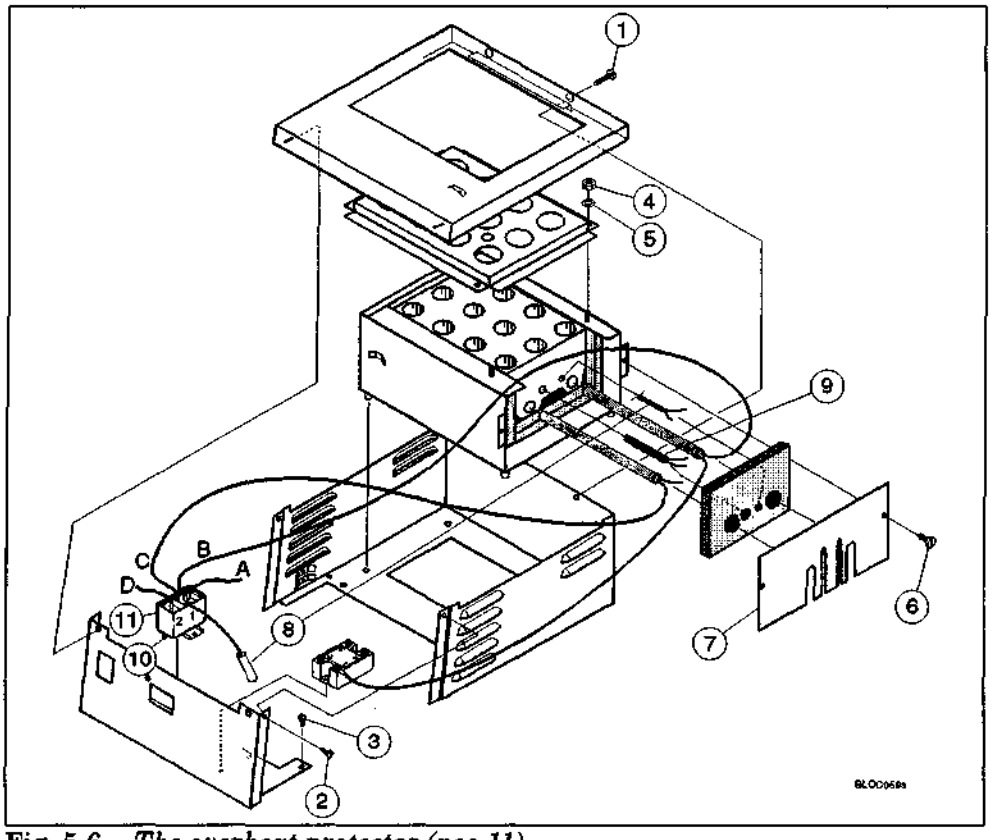

Fig. 5.6 *The overheat protector (pos 11).*

5.4.2 Exchange of solid state relay

1. Disconnect the Digestor from the main supply.
2. To get in to the Digestor follow steps 3-7 in section "Exchange of overheat protector".
3. Disconnect the cables; one from mains switch(2), two from PCB(3, white cable and 4, brown cable) and one from each rod heater (1).
4. Unscrew the relay and under it will be a layer of siliconpaste. (The siliconpaste carry off the heat from the relay).
5. Change the solid state relay according to fig.5.7 (put a thin layer of siliconpaste under it) and assemble in reversed order.
6. Perform a test run.

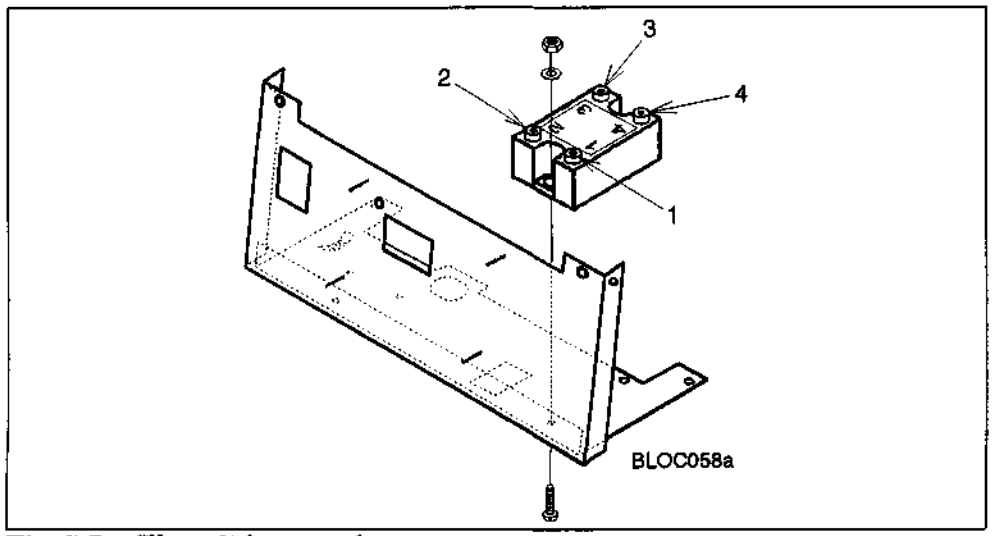

Fig. 5.7 *The solid state relay.*

5.4.3 Exchange of the circuit board

1. Disconnect the Digestor from the main supply.
2. To get in to the Digestor follow steps 3-7 in section "Exchange of overheat protector".
3. Disconnect the cables; JA1(R) and JA2(Y) the cable to the temperature sensor, JE3(PE) the cable to a receptacle in the chassie, JE1(L) the cable to the overtemperature protector, JE2(N) the cable to the mains switch, JC1(+) the white cable to the solid state relay no.3, JC2(-) the brown cable to the solid state relay no.4 and the cable to the controller.
4. Unscrew the four nuts and washers and change the circuit board.
5. Assemble in reversed order.
6. Perform a test run.

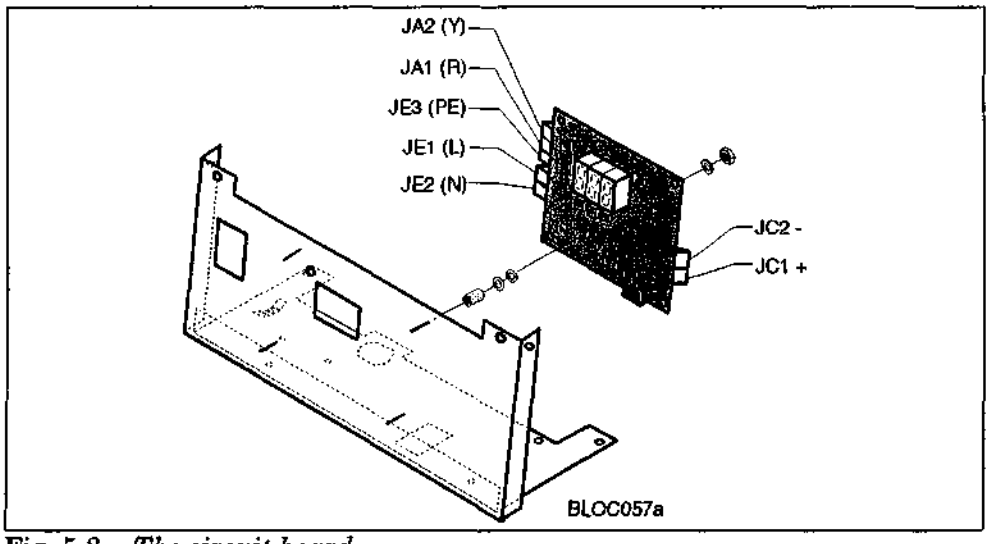

Fig. 5.8 *The circuit board.*

5.4.4 Exchange of temperature sensor

1. Disconnect the Digestor from the main supply.
2. To get in to the Digestor follow steps 3-7 in the section "Exchange of overheat protector".
3. Disconnect the two cables from the PCB; JA1(R) and JA2(Y) where the temperature sensor (pos 9) is placed.
4. Take away the mica lamination (pos 7) by unscrewing the two screws (pos 6). Pull out the sensor through the insulating.
5. Change the temperature sensor and assemble in reversed order.
5. Perform a test run.

5.4.5 Exchange of the rod heaters

1. Disconnect the Digestor from the mains power.
2. Unscrew the two screws (pos 1) holding the rim.
3. Loosen the four feet on the underside and lift up the inner box.
4. Unscrew the two nuts (pos 4) and washers (pos 5) from the guide plate and take it away.
5. Take away the mica lamination (pos 7) by unscrewing the two screws (pos 6).
6. Loose the cables from the rod heaters. (Two cables on the overheat protector and two on the solid state relay.)
7. Pull out the two rod heaters through the insulating.
8. Change the rod heaters and assemble in reversed order.
5. Perform a test run.

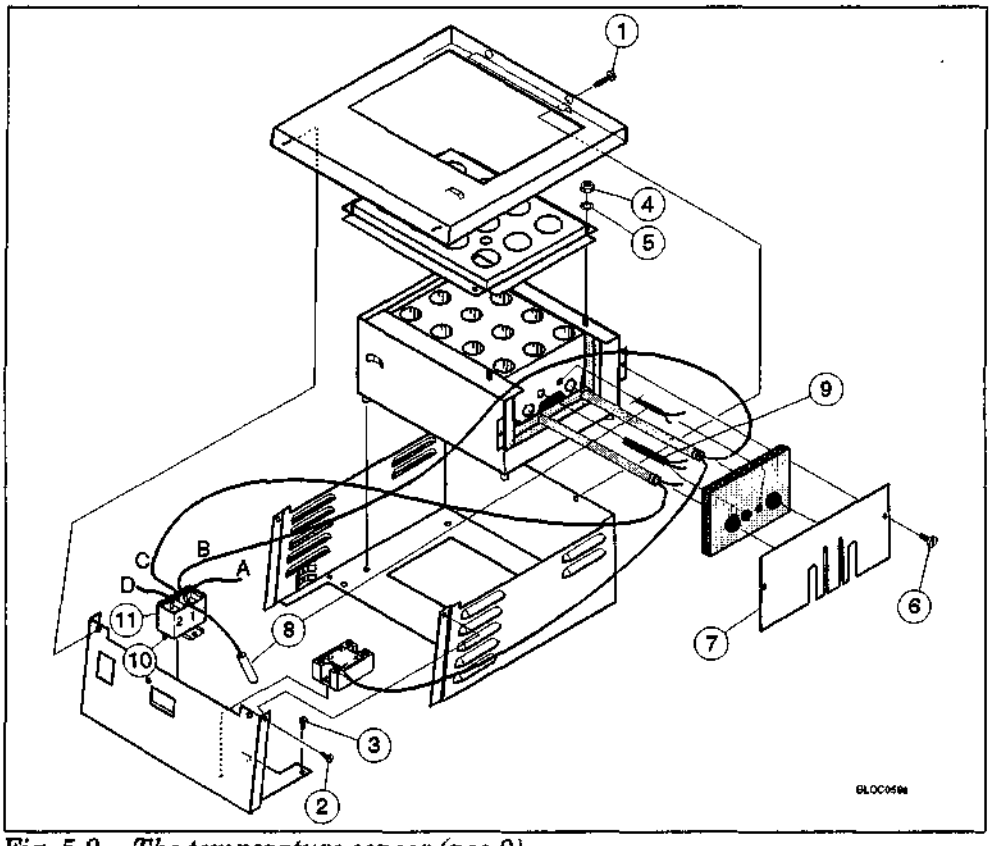

Fig. 5.9 *The temperature sensor (pos 9).*
The two rod heaters.

5.5 Replacement instructions 2015 Lift

Text in the following chapters refers to Fig. 5.10.

5.5.1 Exchange of fuses

Thre are four fuses in the 2015 Lift. Two fuses rated, T 1.6 A are located close to the power inlet. The two other fuses are located on the power supply card, ratings: T 5 A and T 630 mA.

5.5.2 Exchange of parts in the control panel: Timer pos. 7:2, Realay card pos. 7:5 and Transformer pos. 7:8

1. Disconnect the Lift from mains power.
2. Remove the right gable, see pos. 30.
3. Identify and replace the faulty part(s).
4. Assemble in reverse order
5. Perform a test run.

5.5.3 Exchange of: Driving wheel pos. 35 and 36 and Driving belt, pos. 38.

1. Disconnect the Lift from mains power.
2. Remove the drive belt protection pos. 71 and the motor protection, see pos. 70.
3. Loosen the motor pos. 39 and slide it towards the lift tower.
4. Replace the faulty part(s).
5. Assemble in reverse order
6. Perform a test run.

5.5.4 Exchange of Motor, pos. 39

1. Disconnect the Lift from mains power.
2. Remove the drive belt protection pos. 71 and the motor protection, see pos. 70.
3. Remove the right gable pos. 30.
4. Loosen and disconnect the motor.
5. Remove the driving wheel.
6. Assemble in reverse order.
7. Perform a test run.

5.5.5 Exchange of parts in the lift tower: Tube stand arms pos. 1, Electro magnet pos. 2, Exhaust arm pos. 5, Guide bar pos. 10, Sensor pos. 15 &16, Magnet pos. 21 and Slide nut pos. 22

1. Disconnect the Lift from mains power.
2. Remove the covering plate on the tower, see pos. 33.
3. Pull off the exhaust arms pos. 5 and the tube stand arms pos. 1.
4. Replace the faulty part(s).

Note! **Assemble the guide bars so that phased sides are inside the lift tower. The upper sensor should stick out 6 mm from its holder and the lower sensor should stick out 9 mm from its holder.**

5. Assemble in reverse order.
6. Perform a test run.

5.5.6 Exchange of: Ball bearing pos. 19 and Guide screw pos. 26

1. Disconnect the Lift from mains power.
2. Remove the covering plate on the tower, see pos. 33.
3. Lift of the exhaust arm pos. 5 and the tube stand arms pos. 1.
4. Remove the drive belt protection pos. 71.
5. Remove the driving wheel pos. 36.
6. Replace the guide screw pos. 26 and the slide nut pos. 22.
7. Replacement of the ball bearing pos. 19.

7.1. Mark the postion of the support to the ball bearing.

7.2. Loosen the screws securing the support to the ball bearing pos. 18.

7.3. Replace the ball bearing.

8. Assemble in the reverse order.
9. Perform a test run.

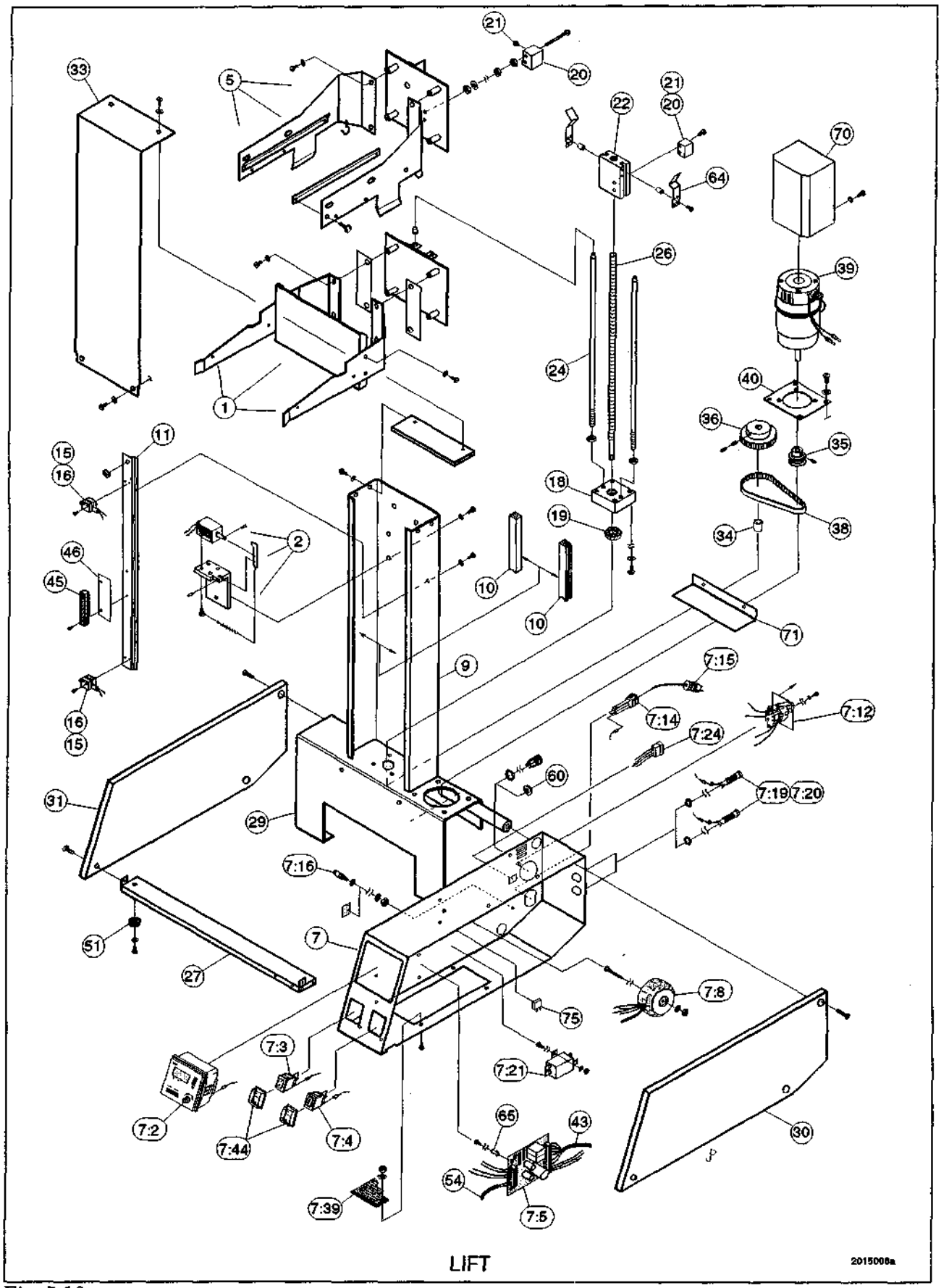

Fig. 5.10

5.6 Replacement instructions 2001 Scrubber

5.6.1 Exchange of fuses

There are three fuses in the 2001 Scrubber. One fuse rated, T 2.5 A, see Fig. 5.11 pos. 1. The two other fuses are located in the power supply inlet, see Fig. 5.11 pos. 2 ratings, see Table below.

Voltage	Fuse rating
100 V	T 3.15 A
110 V	T 2.5 A
200 V	T 1.6 A
230	T 1.6 A

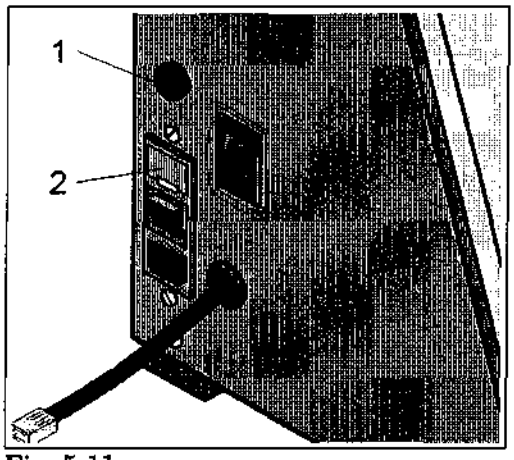

Fig. 5.11

5.6.2 Exchange of air pump/motor and valve

1. Disconnect the Scrubber from mains power.
2. Remove the rear cover.
3. Replace the faulty part.
4. Assemble in reverse order.
5. Perform a test run.

5.7 Controller unit 2000

If the Controller is broken, replace the entire unit.

6 ATTENTION! Circuit boards and ElectroStatic Discharges (ESD)

6.1 STATIC ELECTRICITY CAN BE CONTROLLED

Static electricity is developed by positive and negative charges and depends on the variation between these charges. With the knowledge of how static electricity is formed, it is possible in the daily work to prevent this problem.

6.2 CHARGING

Electrostatic charges appears e.g. when :

- Materials are separated e.g. paper, clothes etc.
- Gases, liquids and particles are flowing.

6.3 ACCUMULATION

An object which is not electrically earthed can be an accumulator of static electricity.

This is the step which is the most easily to be controlled. It is quite possible to eliminate the accumulation of static electricity by a good connection to protective earth.

6.4 DISCHARGING

If an object with a lower potential is brought close enough to the charged object it will allow a discharge of static electricity. If the difference in potential is high enough, will there be discharge in open air between the two objects.

6.5 CIRCUITS AND ESD -SENSITIVITY

The electronic industry is developing smaller and smaller circuits with an increasing number of functions. This increases the sensitivity for static electricity.

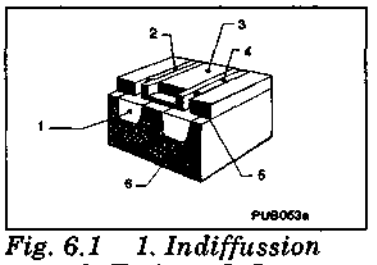

Fig. 6.1 1. Indiffussion area, 2. Emitter, 3. Input, 4. Collector, 5. Silicon oxide, 6. P-Substrate.

E.g. a MOS-transistor (see fig 6.1), the input pin is isolated from the substrate by a very thin oxide. The oxide has a very high resistance but an isolation capacity of only 100 V. If this voltage level is exceeded, a discharge will take place, destroying the oxide layer. This will create an internal short circuit and the MOS-transistor is probably damaged permanently.

In the table below, some circuits and their ESD -sensitivity is mentioned.

Circuit	Voltage
MOS-FET	100-200
J-FET	140-10.000
C-MOS	250-2.000
Schotty	300-2.000
Bipolar transistor	380-1.500
ECL, mounted on a board	500-
SCR	600-1.000

Note! | **Even diodes and resistors are sensitive to ESD.**

6.6 STATIC ELECTRICITY BUILD-UP

Static electricity is always present in our environment, e.g. on working surfaces , floors, chairs, packing material, plastic bags etc. The human being is the greatest threat to the circuits. A person who walks across a floor or works at a bench could generate an electrostatic charge of several thousands of volts (see table below).

Situation	Voltage humidity	
	<20 %	>65 %
Person walking on a carpet	35.000	1.500
Person walking on PVC-floor	12.000	250
Working at a bench	6.000	100
Plastic folder	7.000	600

6.7 CONTROL AND PROTECTION

Accumulation of electrostatic charges in electric conducting materials, may be effectively prevented. This is done via a connection to protective earth. Insulated materials can not be electrically connected to protective earth, the electrostatic charge is stored until it is discharged or neutralised with ionised air.

If the rules mentioned below are followed, and an effective electrostatic protection will be obtained.

- Handle all electrostatical sensitivity materials in an EPA (ESD Protected Area).
- Transport all ESD sensitivity material in a shielded box or bag. Such containers has to protect against ESD and a static field.
- Make sure that your supplier follows these basic four rules.
- Control and check the ESD-protection, to secure the function and the quality.

6.8 ESD-PROTECTED AREA (RULE 1)

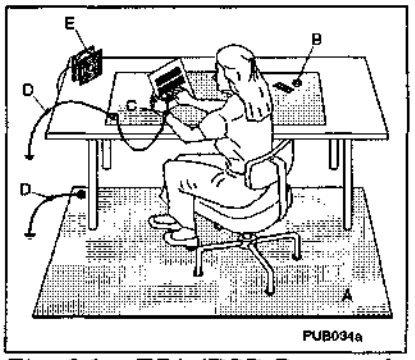

Fig. 6.2 EPA (ESD Protected Area)

An EPA could look like this:

- Place an electrically conductive carpet in front of the work station (see fig). On the bench is a conductive top placed. The carpet and the bench top is conducted to protective earth.
- The person working at the bench should be connected to protective earth with special wrist band.
- To protect the person against isolation malfunctions in any apparatus connected to the mains, supply all earth connections with a 1MΩ protective resistance.

6.9 ESD-PROTECTED PACKING (RULE 2)

There are different types of packing and transport materials for ESD-protection. Here are three examples:

- Metallic and shielded bags has a metallic film, which forms a "Farradays cage", this prevents charges and fields to penetrate. The metallic film normally consists of nickel or aluminium.
- Velostat^{TM} is a black conductive plastic material which is suited to make boxes, bags etc. Boxes are used when mechanical and ESD- protection is desired.
- Antistatical materials are made of chemical processed plastic. These materials have no shielding properties. These materials are best used for storing of passive components and drawings.

6.10 NOTE TO SUPPLIERS (RULE 3)

Make sure that suppliers follows the basic rules:

- Store components and circuits boards in ESD-protected packages.
- Soldering shall be made at an EPA and the soldering bit must be connected to protective earth, see Fig. below.

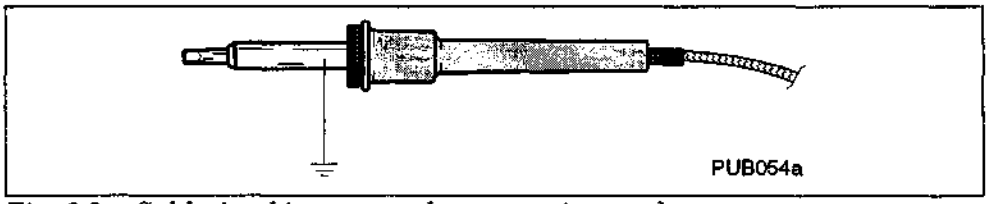

Fig. 6.3 Soldering bit connected to protective earth

6.11 MAINTENANCE AND CONTROL (RULE 4)

To get the correct function and quality, control and check all ESD-protection.

6.12 FIELD SERVICE

We recommend:

- The use of a special service kit, consisting of a portable EPA.
- To use metallic shielded bags of well known brands when transporting ESD-sensitivity materials.

6.13 CHANGING THE AC POWER CABLE

Caution! **The safety on a Class I equipment, depends on a proper connection to protective ground. To avoid the risk of electric shock or damage, the green/yellow conducters always must be connected to protective earth. Never disable the function of the protective earth.**

A Appendix A

A.1 Engineering and service depot change orders

Place for Technical Newsletter.

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B Appendix B

B.1 Schematics

Block diagram, temp regulator	B:3
Component layout, temp regulator, front	B:4
Component layout, temp regulator, rear	B:5
Interconnection diagram DS6	B:6
Interconnection diagram DS6/115V	B:7
Interconnection diagram DS12	B:8
Interconnection diagram DS12/115V	B:9
Interconnection diagram DS20	B:10
Interconnection diagram DS40	B:11
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Circuit diagram, temp regulator 2/5	B:13
Circuit diagram, temp regulator 3/5	B:14
Circuit diagram, temp regulator 4/5	B:15
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Interconnection diagram, Lift System, 60Hz	B:19
Interconnection diagram, Lift System	B:20
Block diagram 2000 Digestor System, Controller	B:21
Component layout, Controller	B:22
Circuit diagram, Controller	B:23
Component layout, Flow Regulator	B:24
Interconnection diagram, Flow Regulator, 230V	B:25
Interconnection diagram, Flow Regulator, 115V	B:26
Circuit diagram, Flow Regulator	B:27

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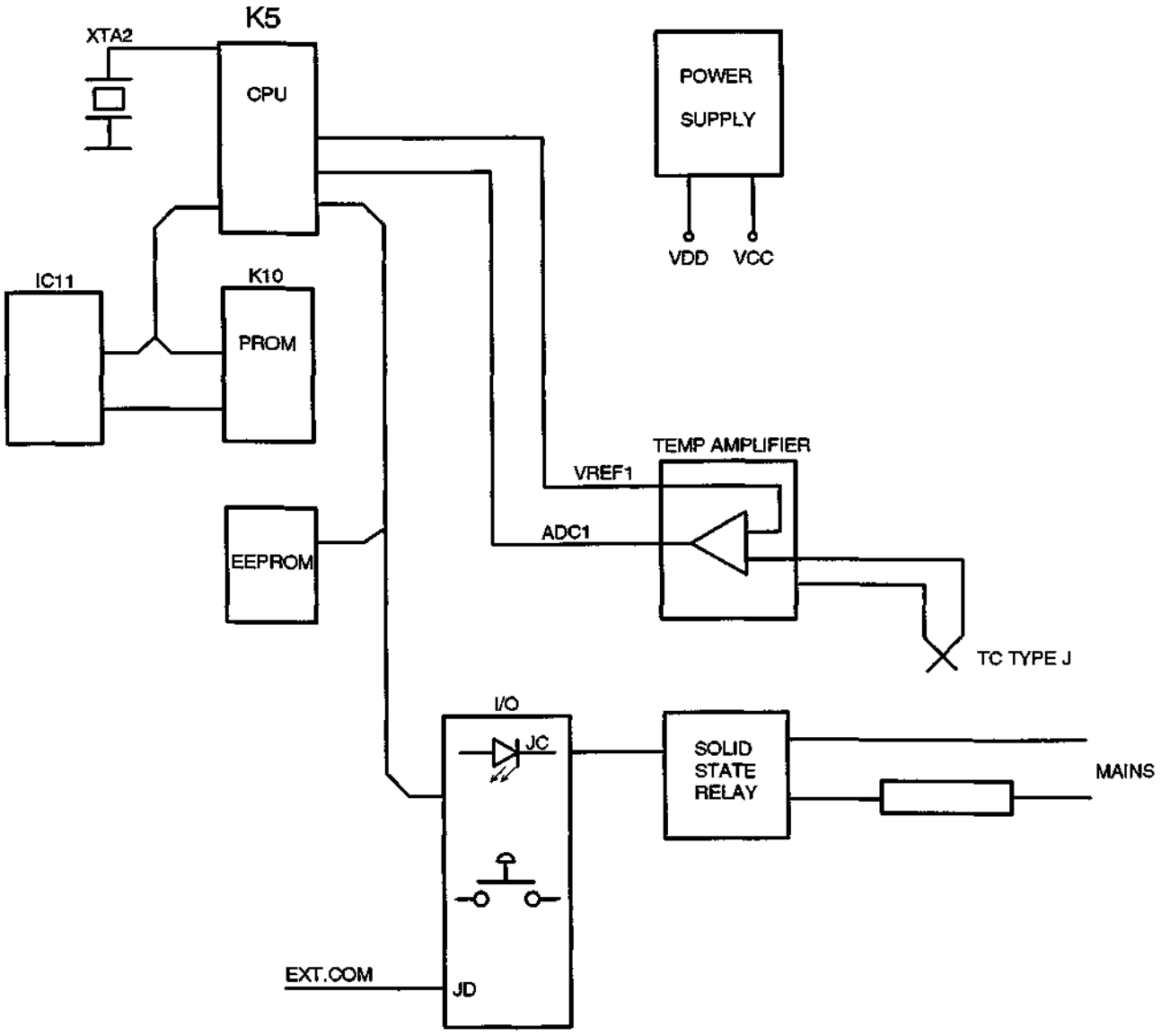

BLOCK DIAGRAM TEMP REGULATOR

BLOC049a

Rev	Ändringsbeskrivning	Datum	Sign	Godk
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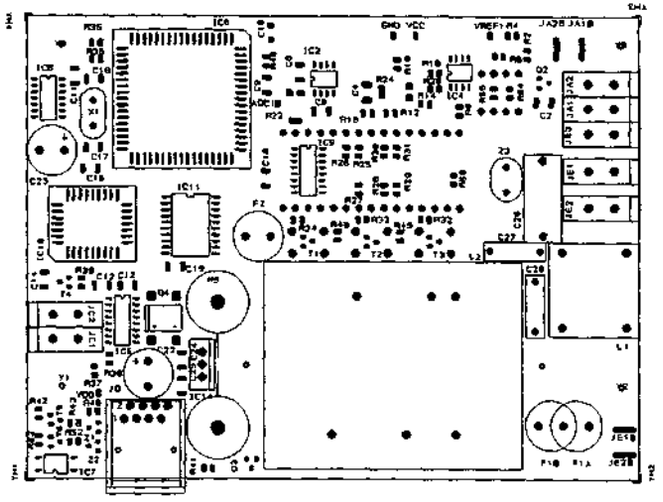

FRONT

Equipped with components

1000 5240 230V

1000 5622 115V

Konstr.	Ritad	Datum	Granskt.	Godk	Datum	Rev.	Datum	Skala	Bladev
	SNn	930715				5			1 / 2

tecator

DS-SYSTEM
TEMPERATURE REGULATION BOARD
1000 5238

Ritnings nr: ES238.COD
10005238- 753

B:4

Rev	Ändringsbeskrivning	Datum	Sign	Godk
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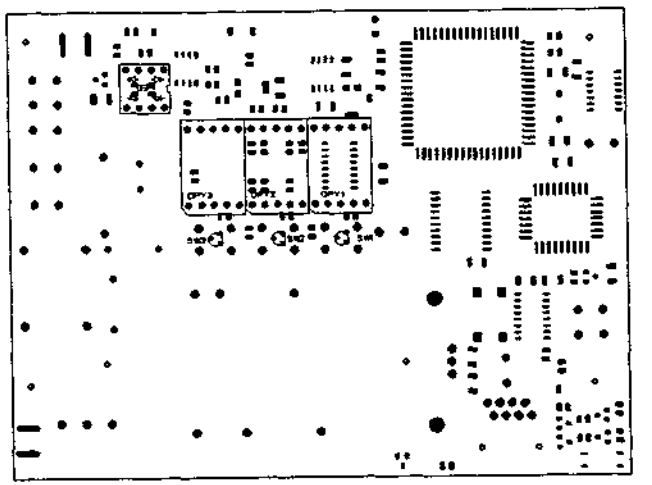


REAR

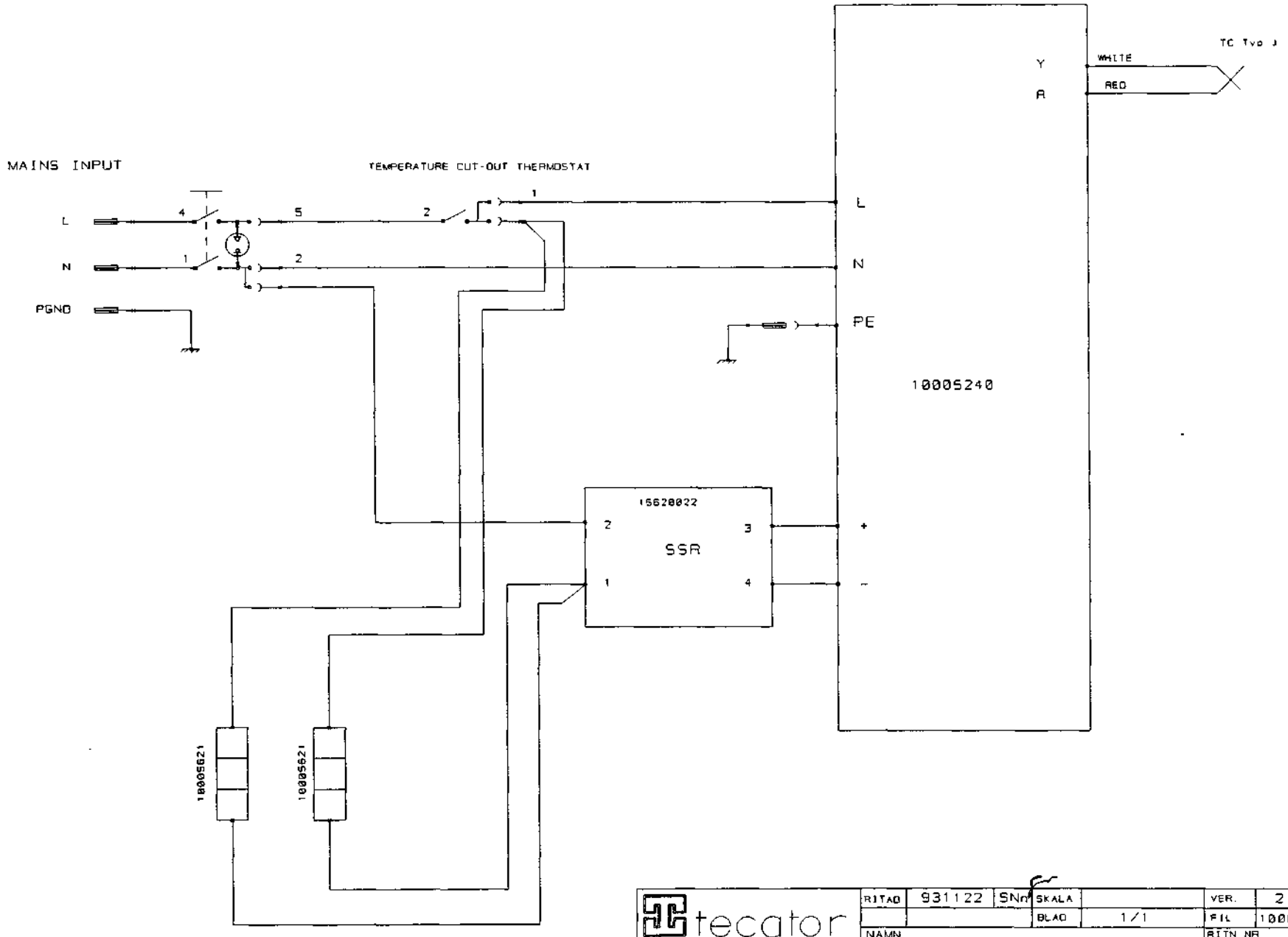
B:5

Konstr.	Ritad	Datum	Granskn.	Godk	Datum	Rev	Datum	Skala	Bladnr
	SNn	930715				5			2 / 2

tecator

DS-SYSTEM
TEMPERATURE REGULATION BOARD
1000 5238

Ritningsnr: 65238.000
10005238- 753



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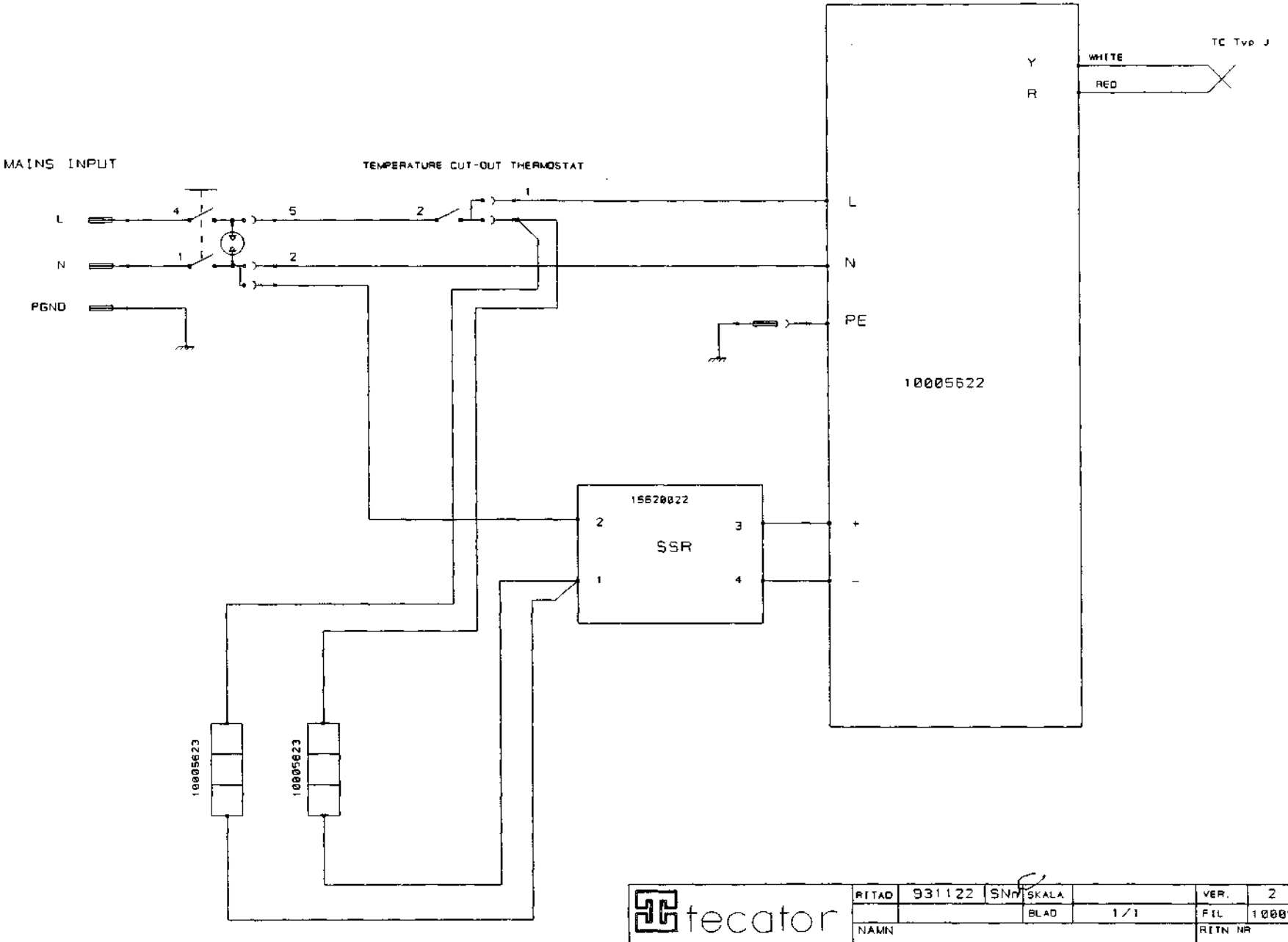

B:7

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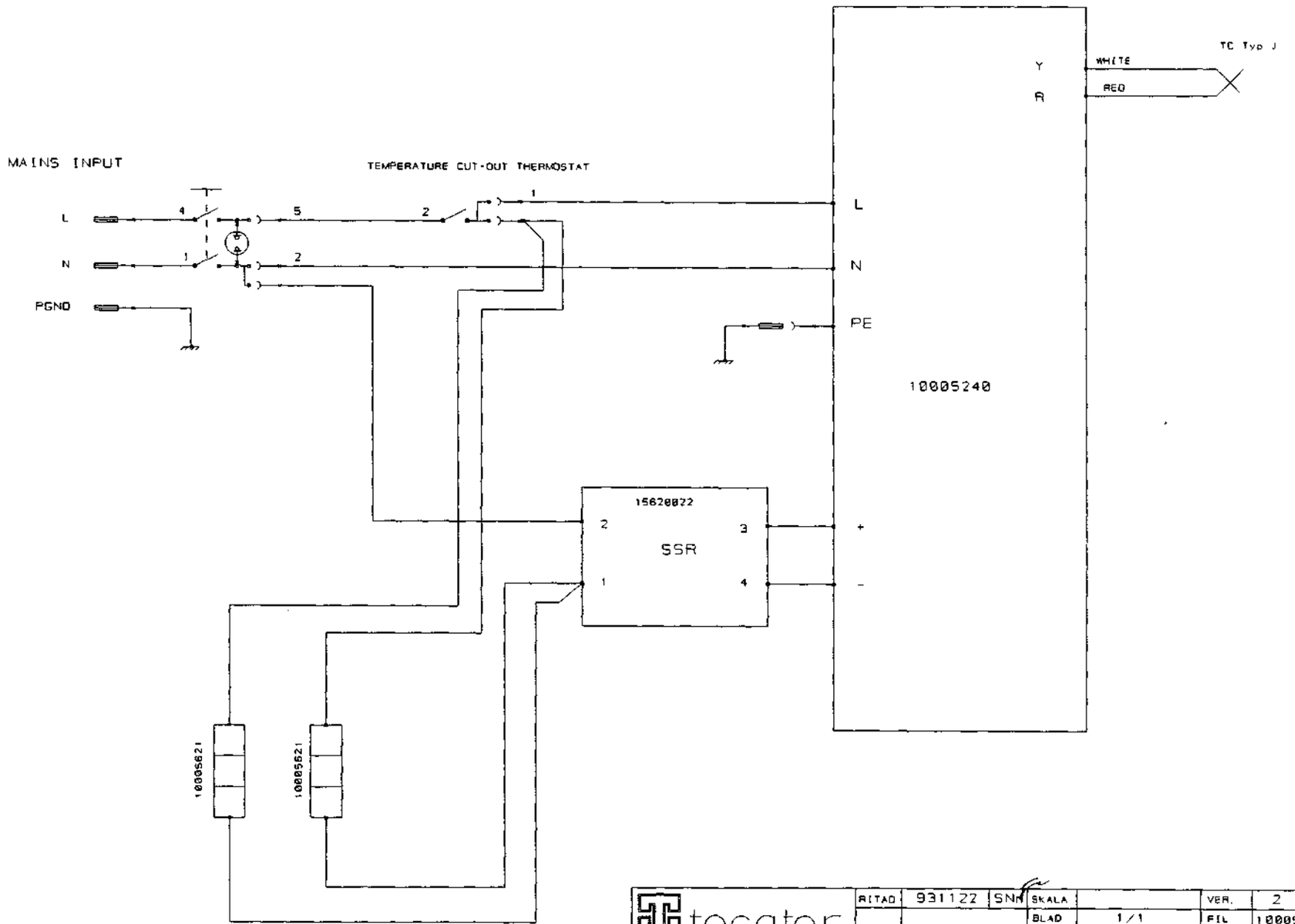

B:8

tecator

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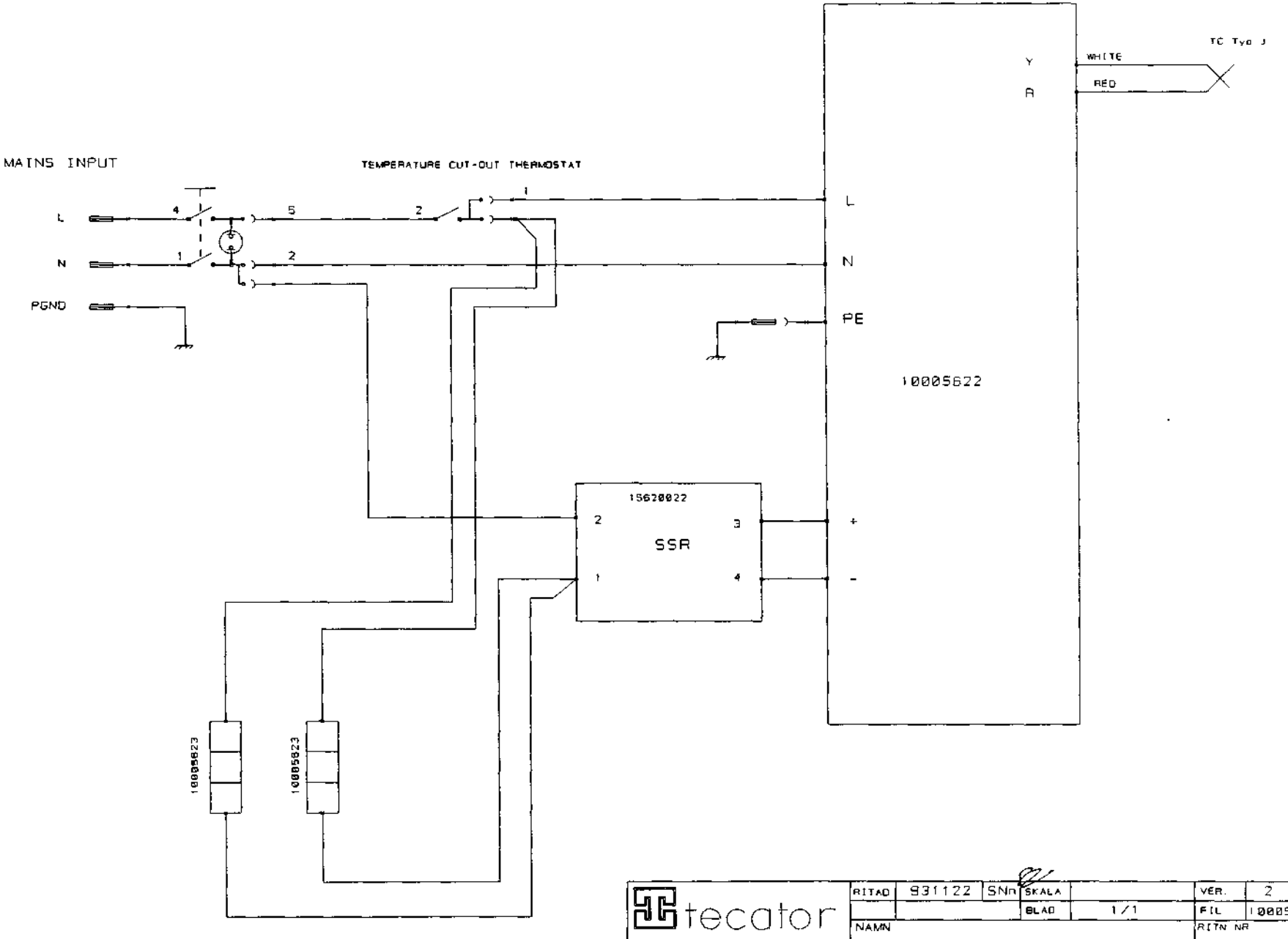
NAMN: DIGESTOR DS12

RITN NR: 1000 5469-863



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tecator

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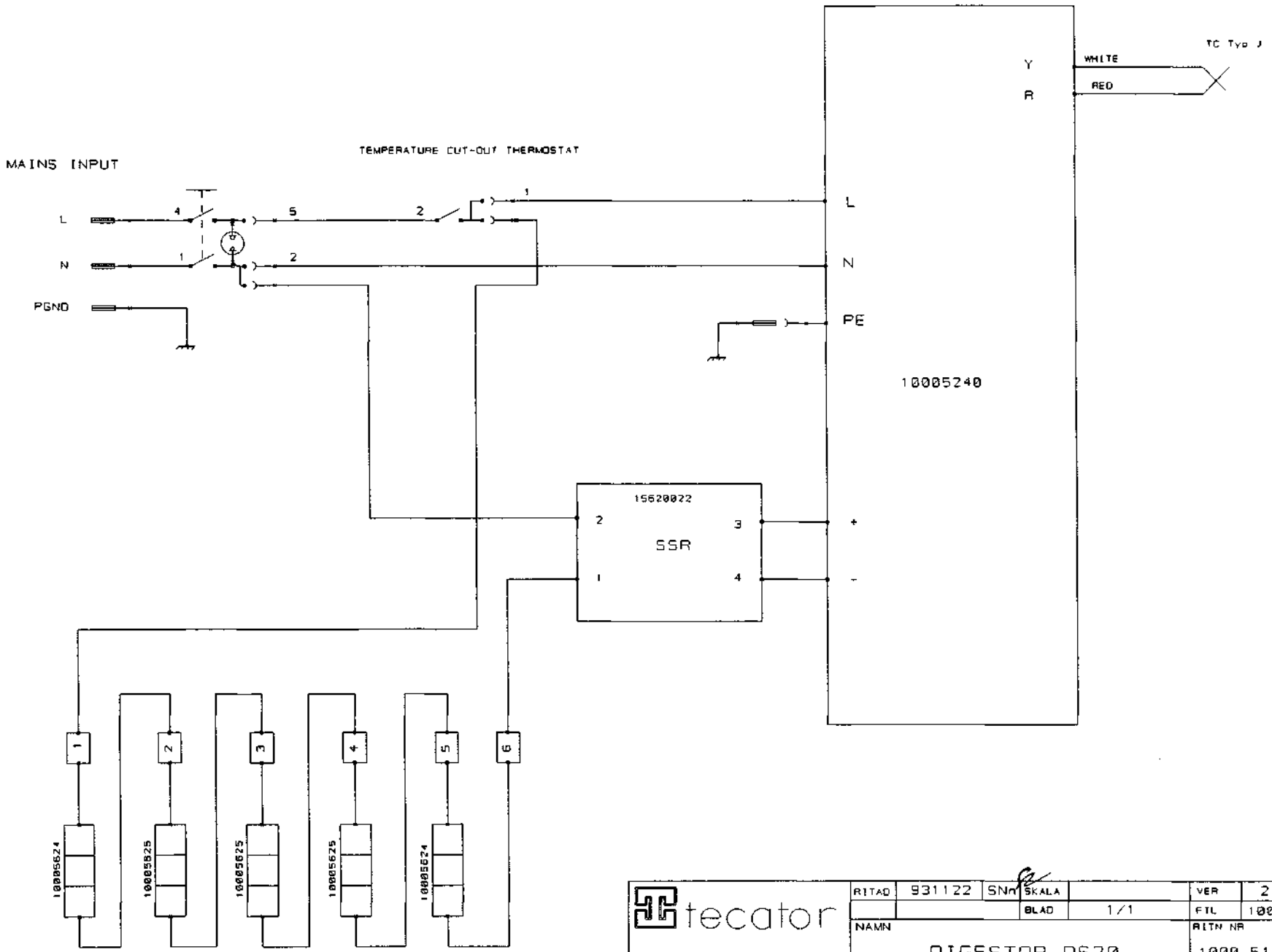
NAMN
DIGESTOR DS12/115V

RITN NR
1000 5556-863



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tecator

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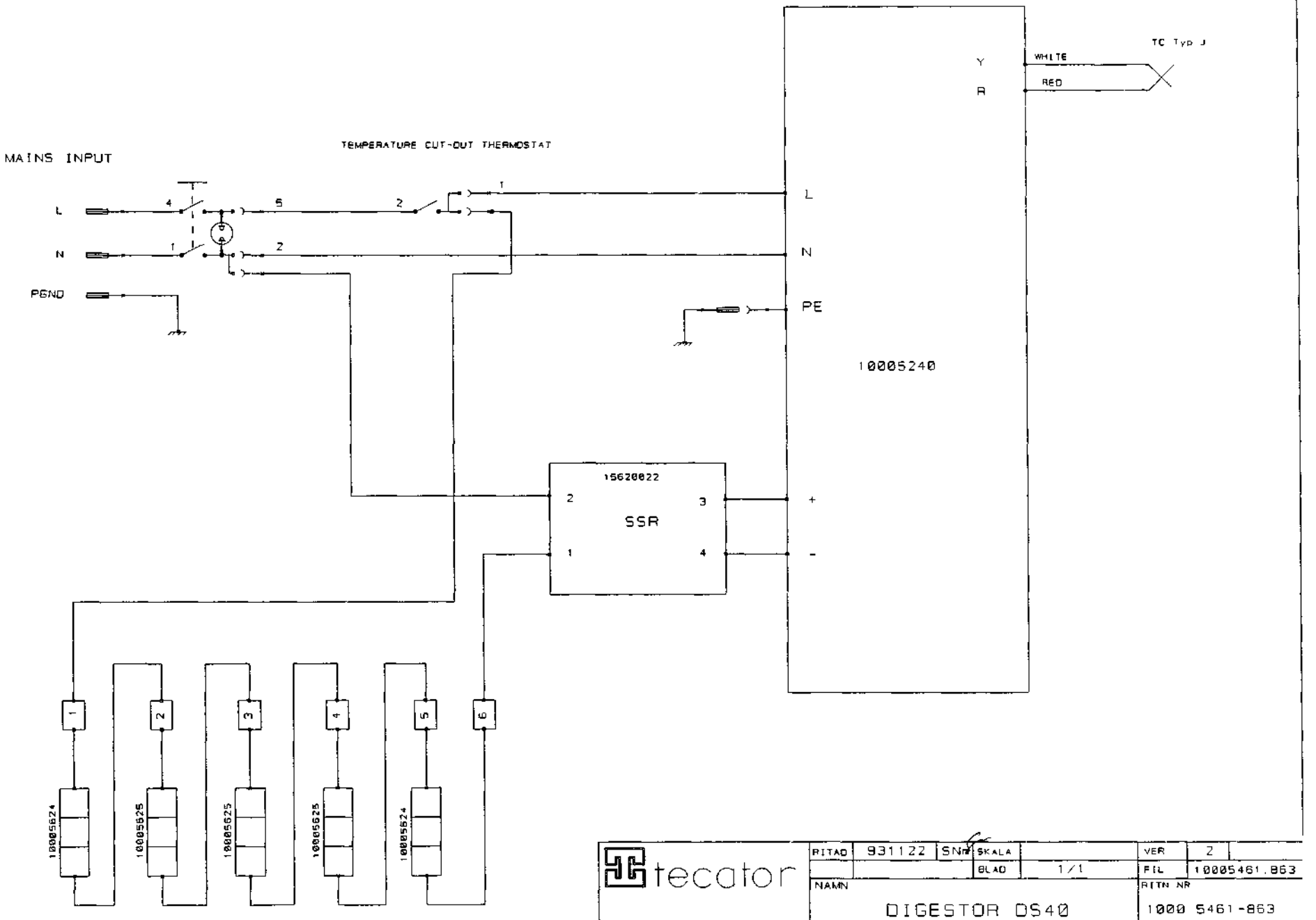
NAMN
DIGESTOR DS20

RITN NR
1000 5164-863



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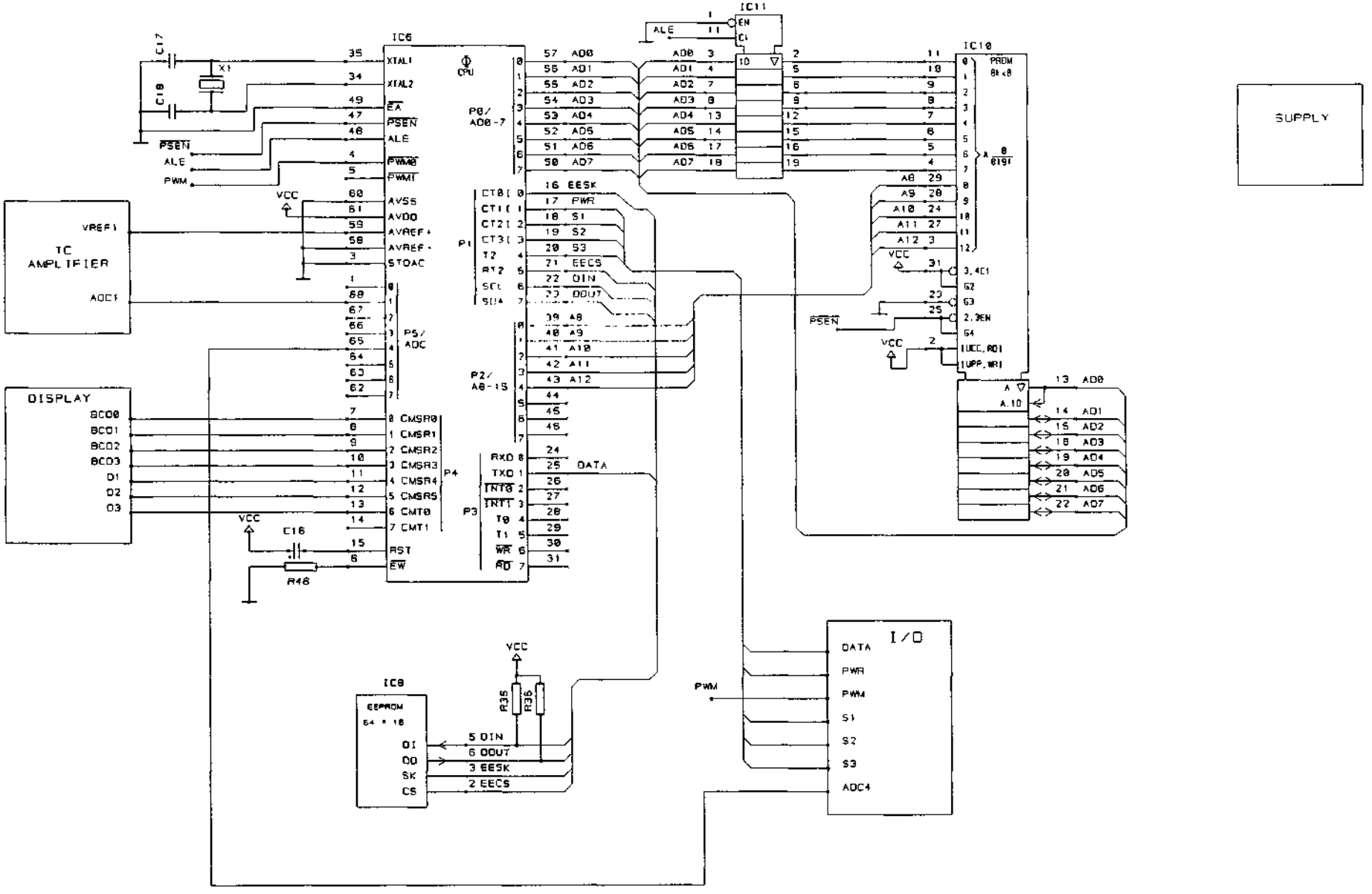

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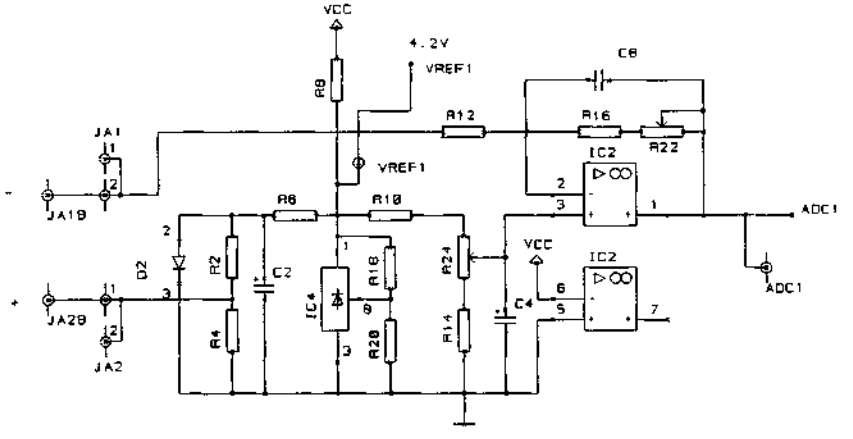
	NAMN	TEMPERATURE REGULATOR				RITN NR	10005238-B13



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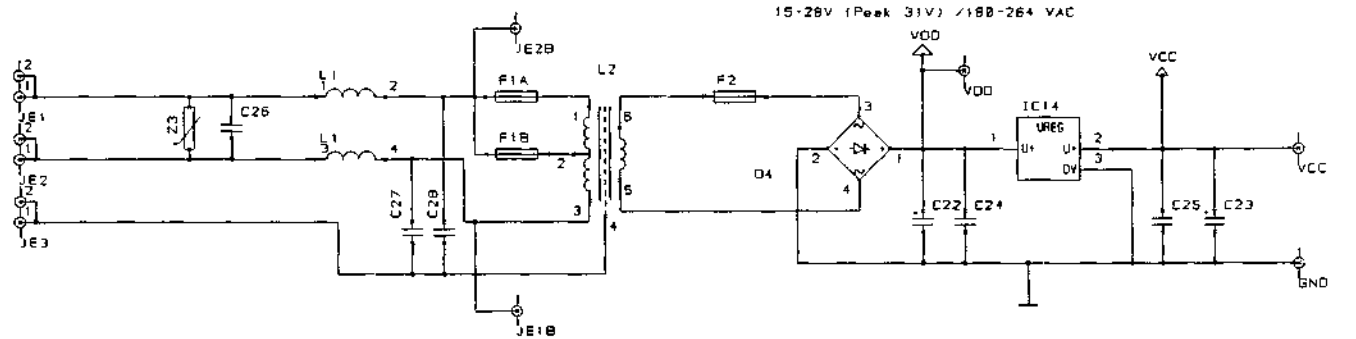

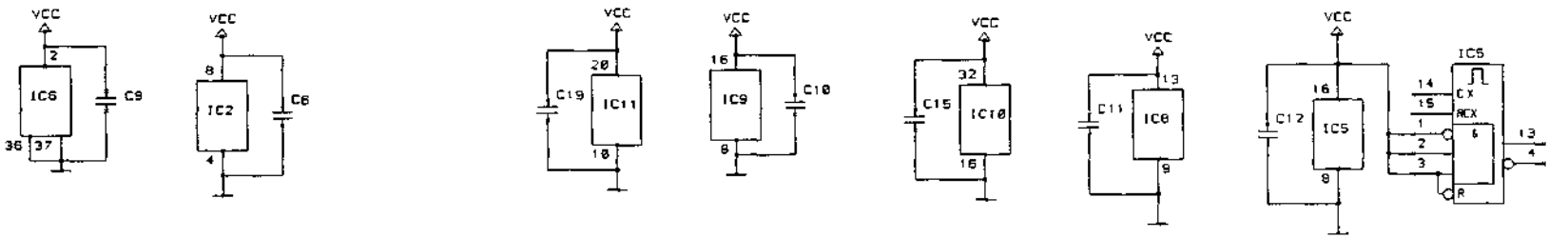

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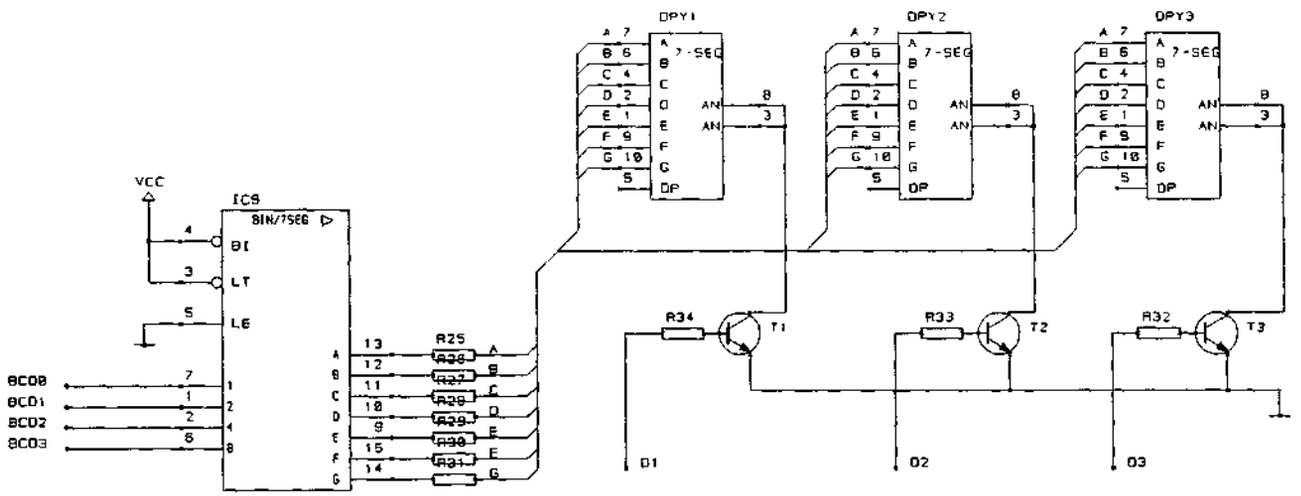

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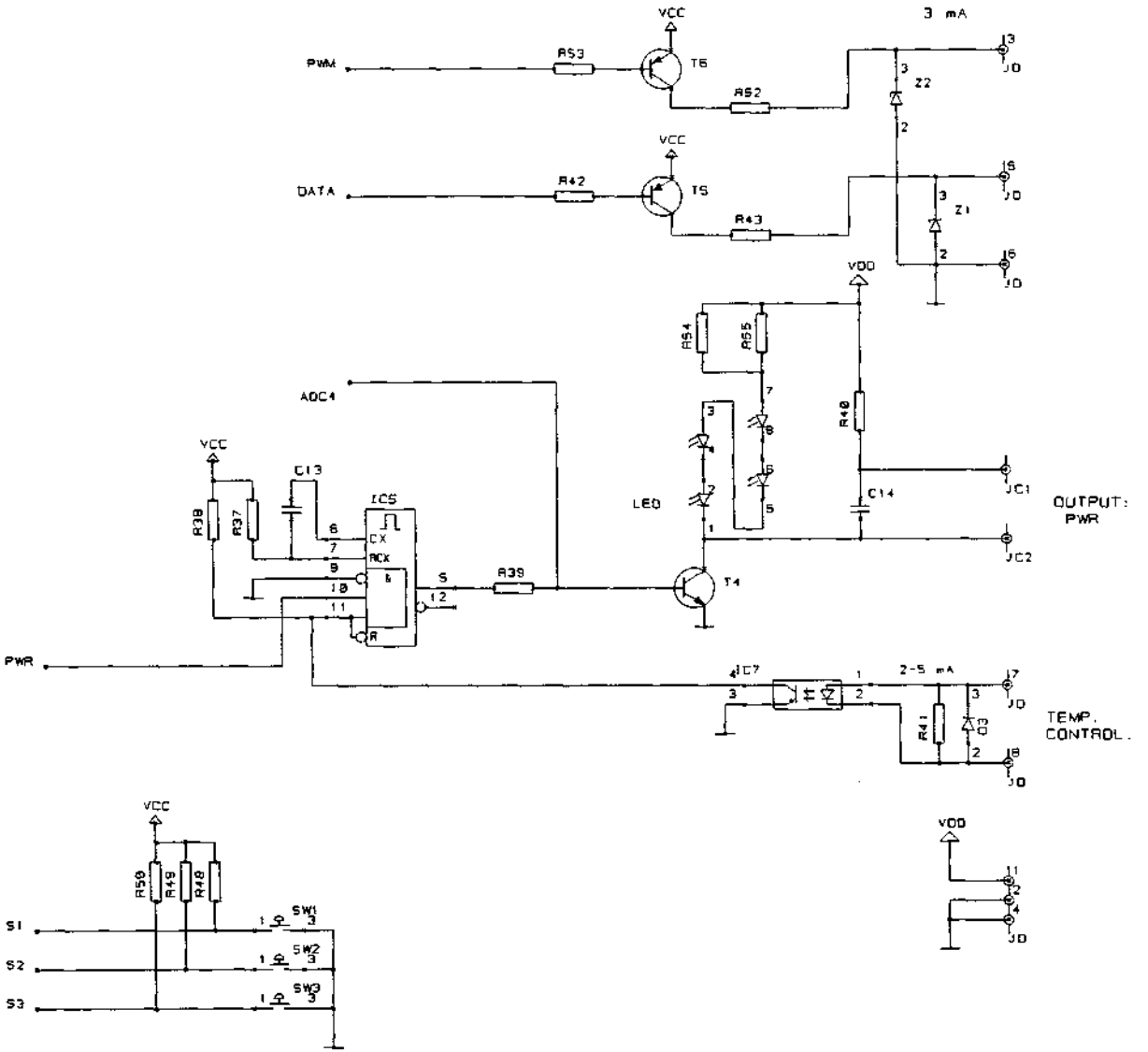

J0

1 VDD
2 GND
3 → PWM
4 GND
5 → DATA
6 GND
7 ← TEMP CTL
8 →

B:16

tecator	RITAD	931214	SIGN	SKALA		VER	1
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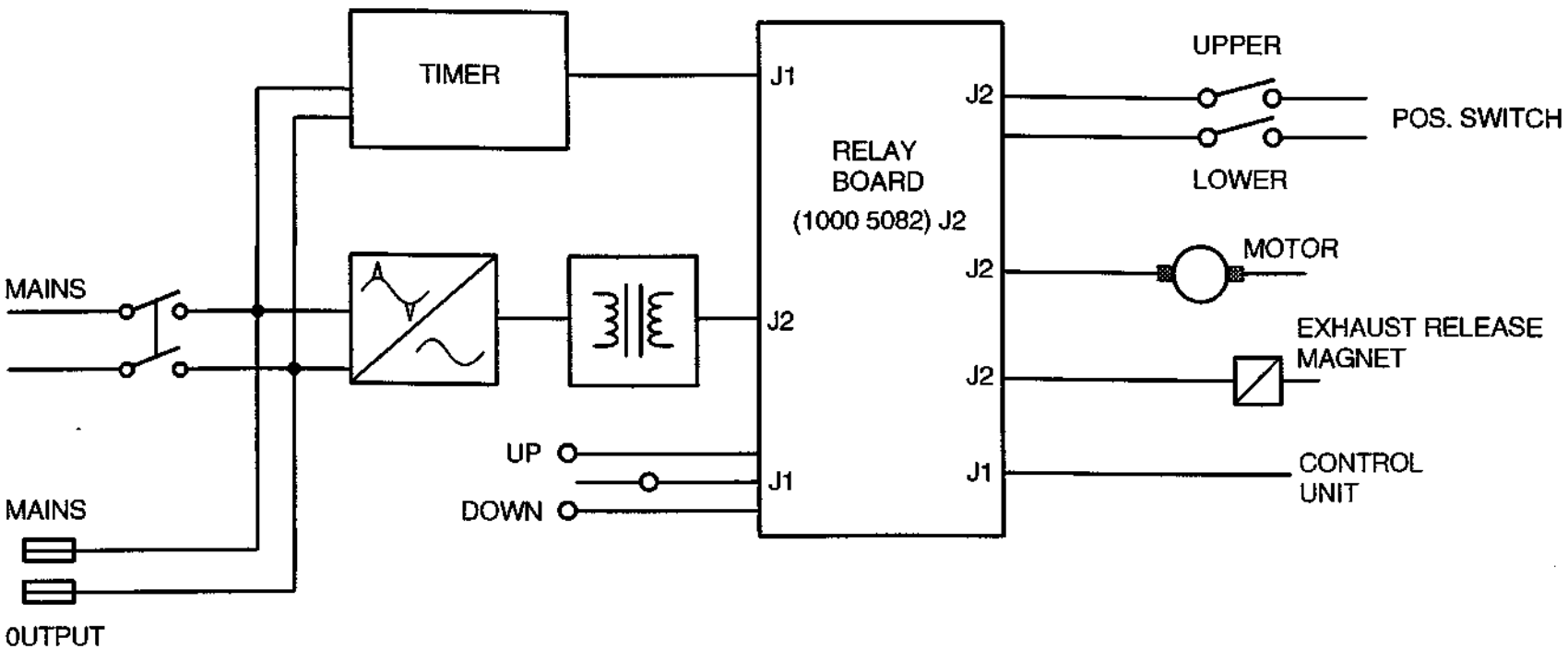
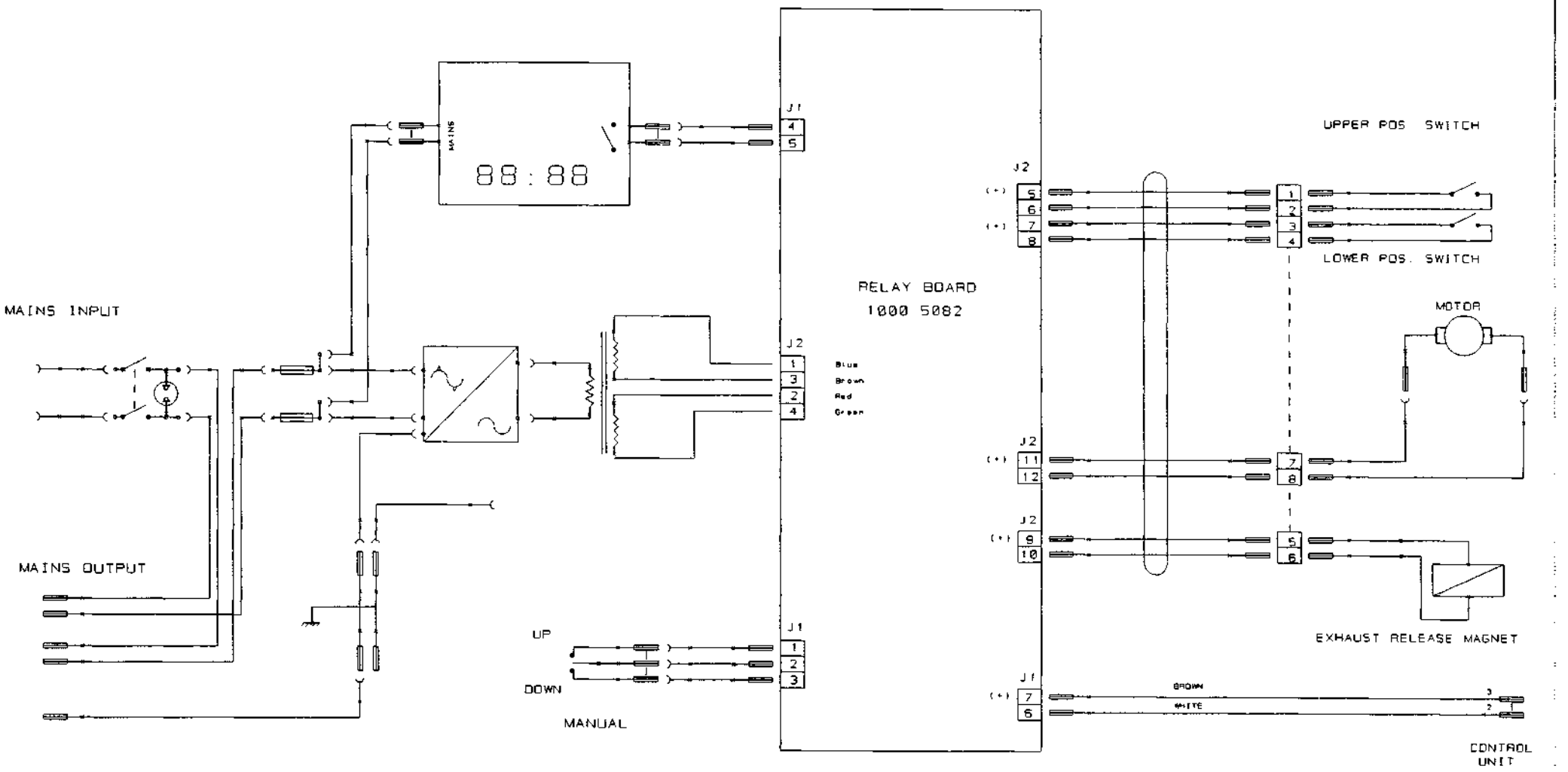


BLOCK DIAGRAM 2000 DIGESTION SYSTEM, LIFT SYSTEM

BLOC051a



B:18

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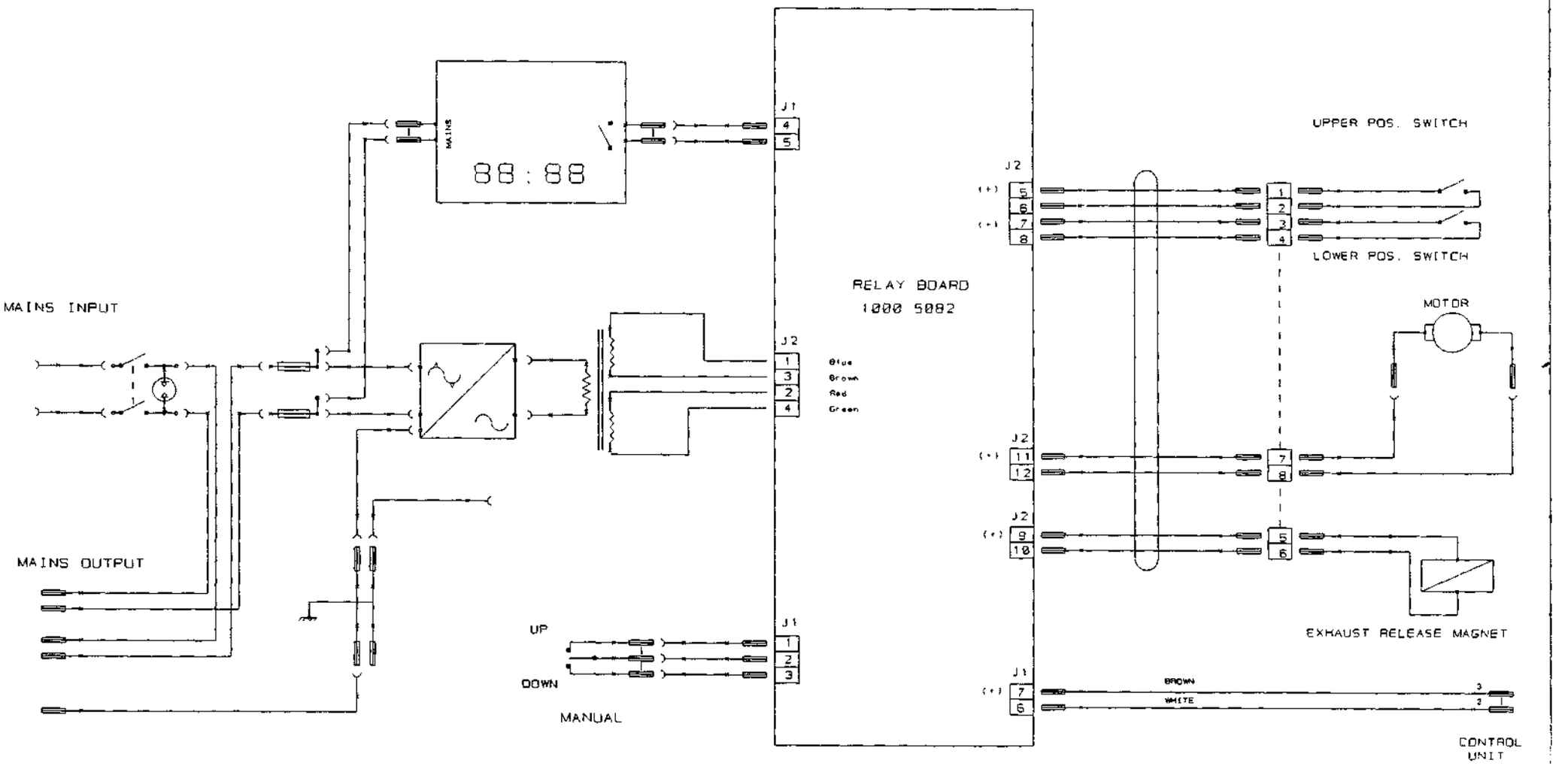
	NAMN	2015 LIFTSYSTEM				RITN NR	1000 5520-863



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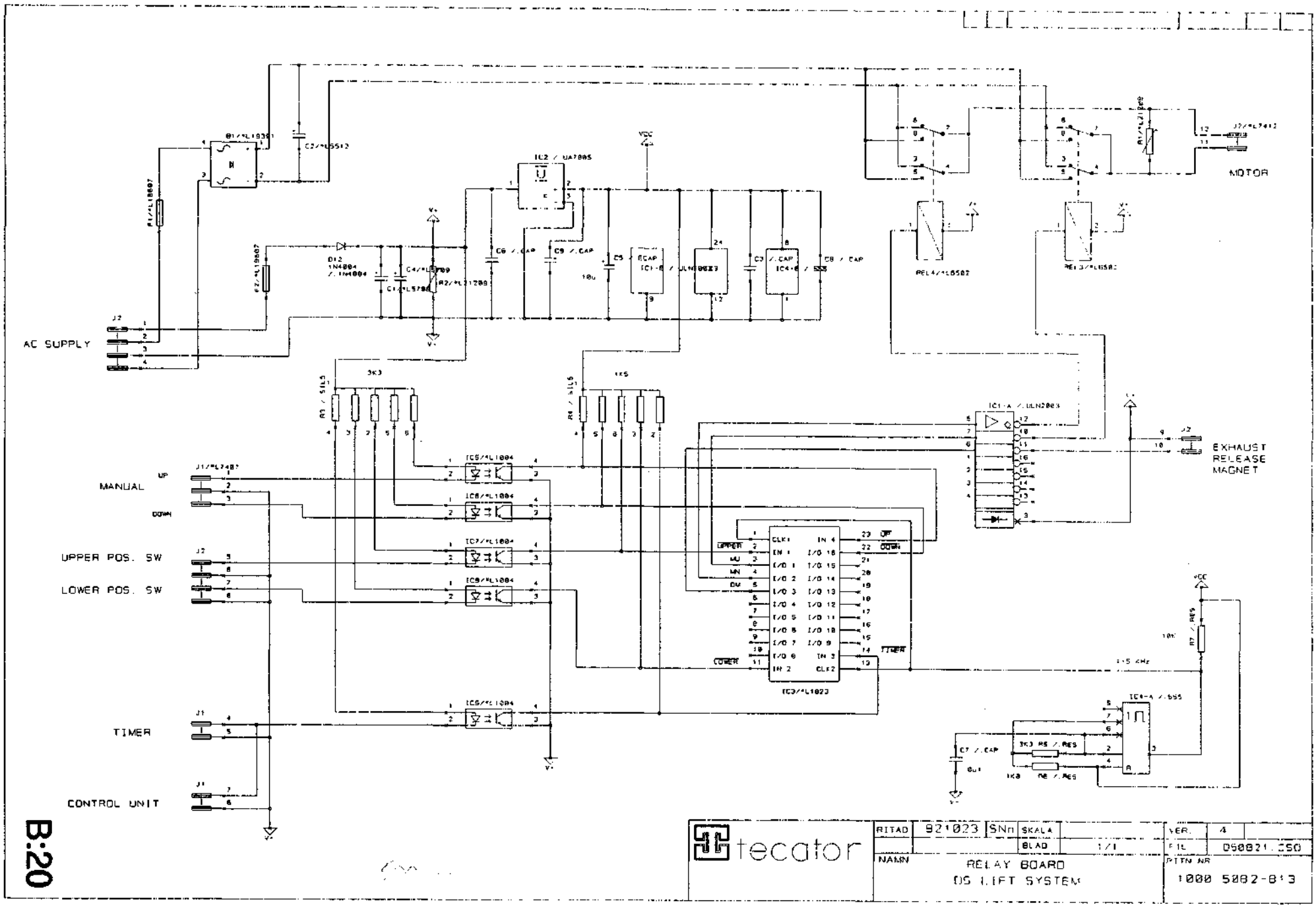
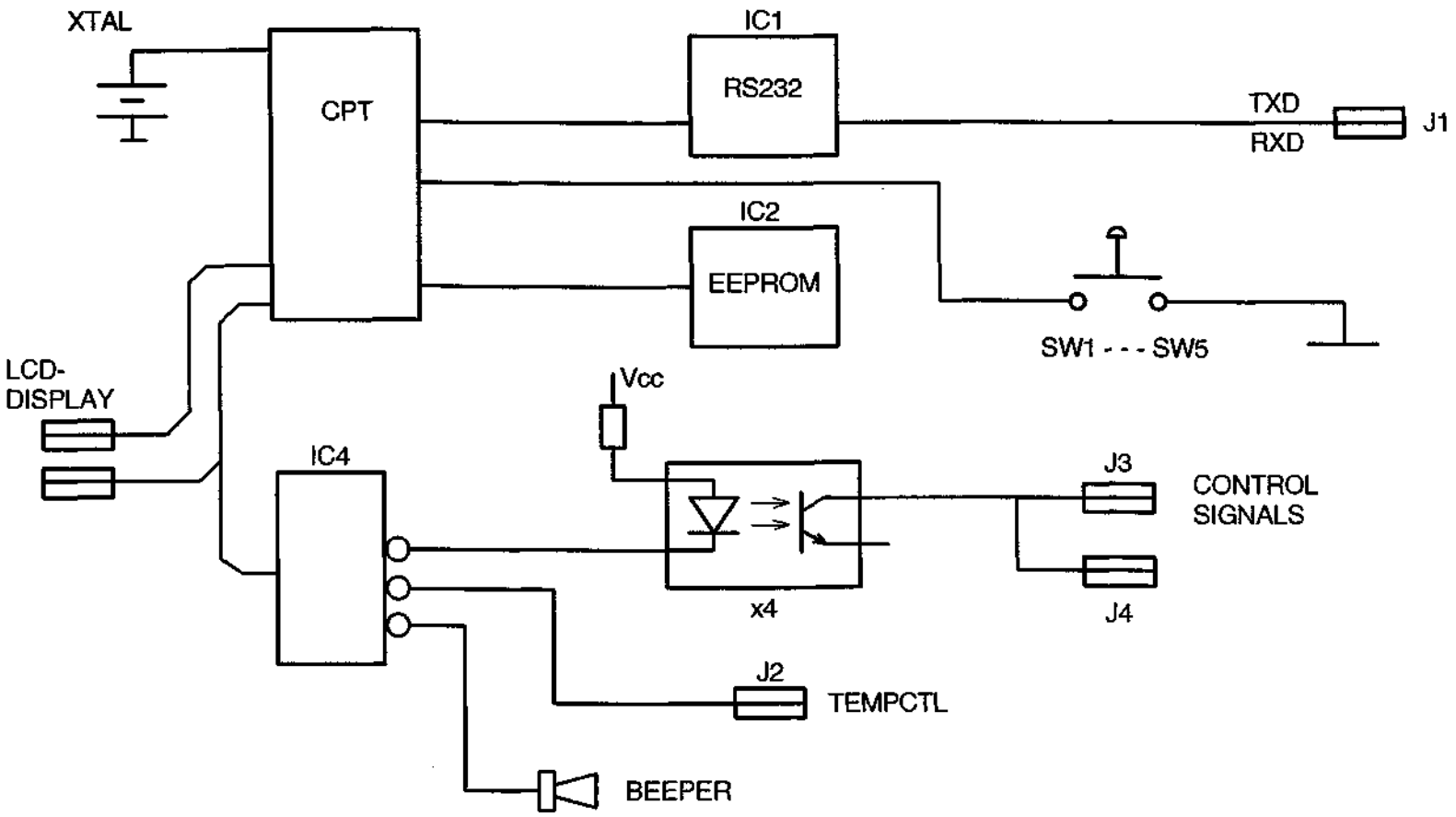

AC SUPPLY
MANUAL
UP
DOWN
UPPER POS. SW
LOWER POS. SW
TIMER
CONTROL UNIT
MOTOR
EXHAUST RELEASE MAGNET
IC2 / UA7805
IC1-A / ULN2803
IC3/*L1023
IC4-A / 555
3K3
1K5
B:20
tecator
RITAD 921023
SNn
SKALA
BLAD 1/1
VER. 4
FIL 050821.CSO
NAMN
RELAY BOARD
DS LIFT SYSTEM
PTTN NR
1000 5082-813



BLOCK DIAGRAM 2000 DIGESTOR SYSTEM,CONTROLLER BLOC050a

Rev	Ändringsbeskrivning	Datum	Sign	Godk
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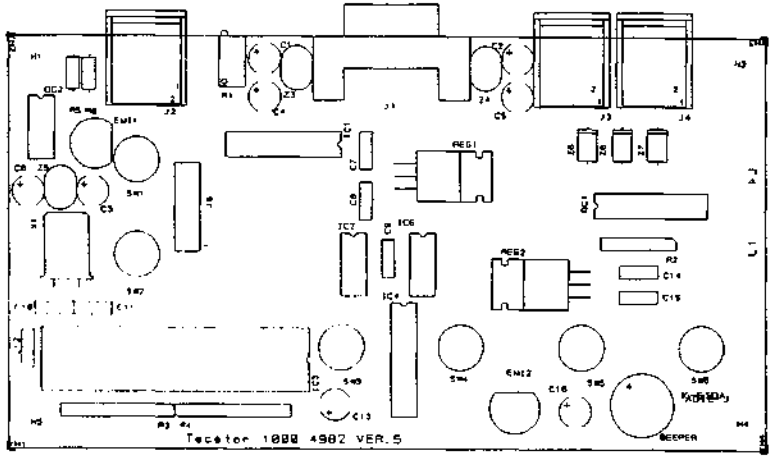


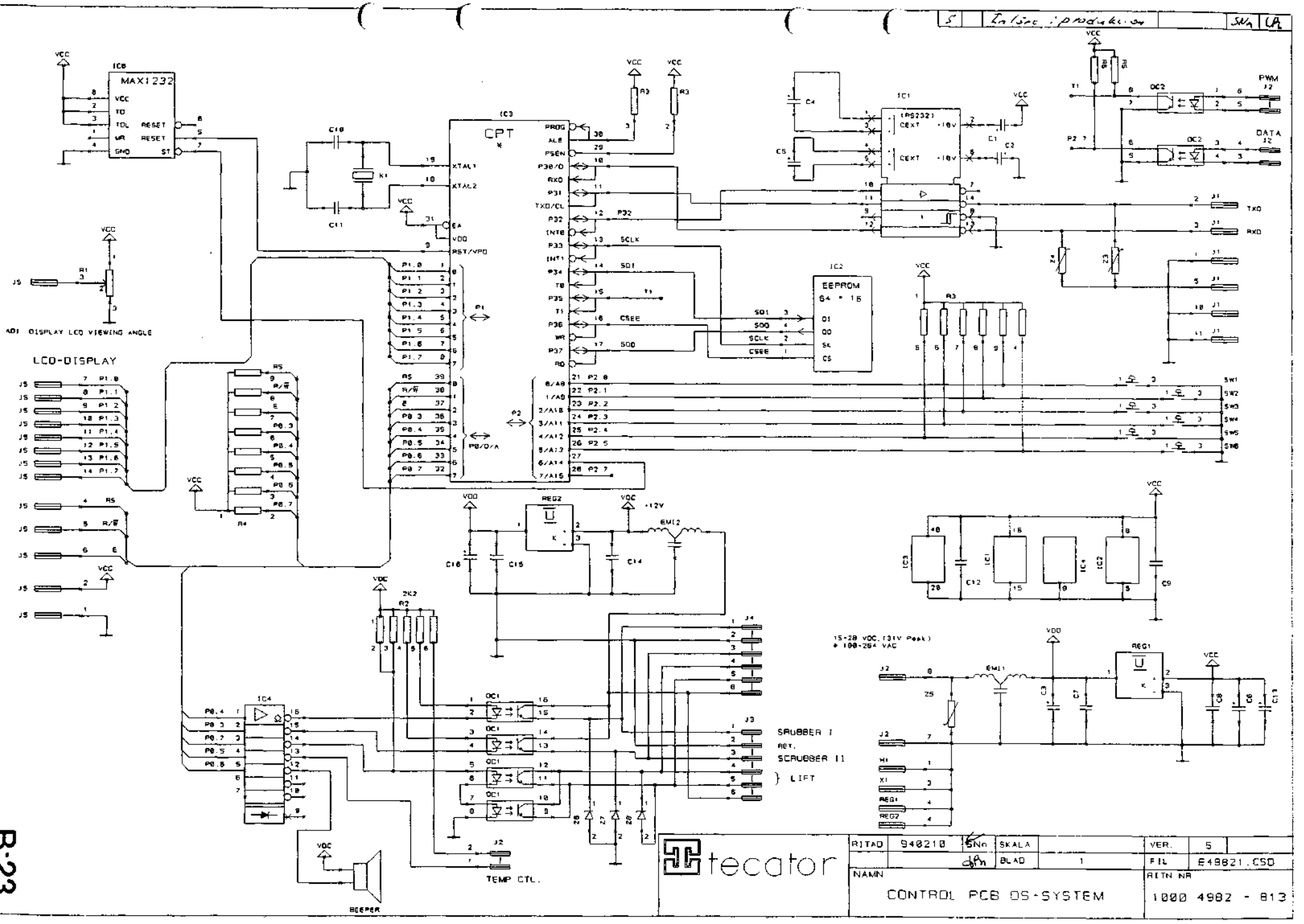
Konstr	Ritad	Datum	Granskr.	Godk.	Datum	Rev	Datum	Skala	Blad av
SNn		940218				5		1:1	1 / 1

Tecator

CONTROL PCB

Artikelnr:
1000 4982 -753

B.22


5
Initial production
IC6
MAX1232
VCC
TD
TDL
WR
GND
RESET
RESET
ST
IC3
CPT
K
PROG
ALE
PSEN
P30/D
RXD
P31
TXD/CL
P32
INT0
P33
INT1
P34
T0
P35
T1
P36
WR
P37
RD
XTAL1
XTAL2
EA
VDD
RST/VPD
P1
P2
P0/D/A
C10
K1
C11
IC1
MS2321
CEXT
+10V
C4
C5
C1
C2
IC2
EEPROM
64 * 16
DI
DO
SK
CS
SDI
SDO
SCLK
CSEE
PWM
J7
DATA
J2
TXD
RXD
J1
R1
J5
ADJ DISPLAY LCD VIEWING ANGLE
LCD-DISPLAY
R5
R4
R3
R2
2K2
SW1
SW2
SW3
SW4
SW5
SW6
REG2
REG1
+12V
EMI2
EMI1
C16
C15
C14
C12
C9
C8
C6
C13
C7
C3
IC4
OC1
OC2
J4
J3
SNUBBER I
RET.
SNUBBER II
} LIFT
15-28 VDC (31V Peak)
& 100-264 VAC
TEMP CTL.
BEEPER
VDC
VDD
VCC
tecator
RITAD 940210
SKALA
BLAD 1
VER. 5
FIL E49821.CSD
NAMN
CONTROL PCB OS-SYSTEM
RITN NR
1000 4982 - 813
B.23

Rev.	Ändringsbeskrivning	Datum	Sign	Godk

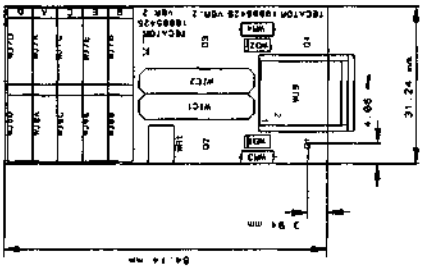
Konstr	Ritad	Datum	Dimmk.	Godk.	Datum	Rev.	Datum	Skala	Blad av
SNR		931005			240305	2		1:1	1 / 1

Ritnings nr:

1000 5425- 753

FLOW REGULATOR

tecator



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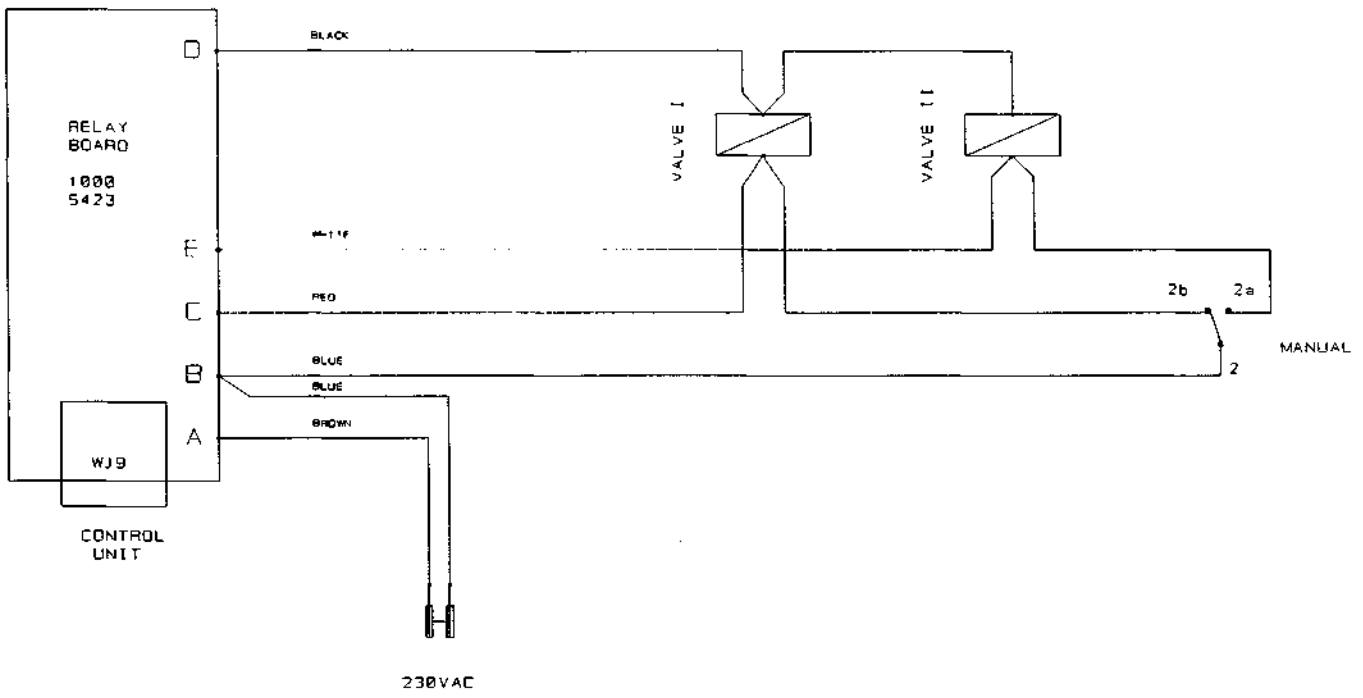
2	Black was Green, White was Grey	940418	SNn	

HIGH = I + II

LOW = II



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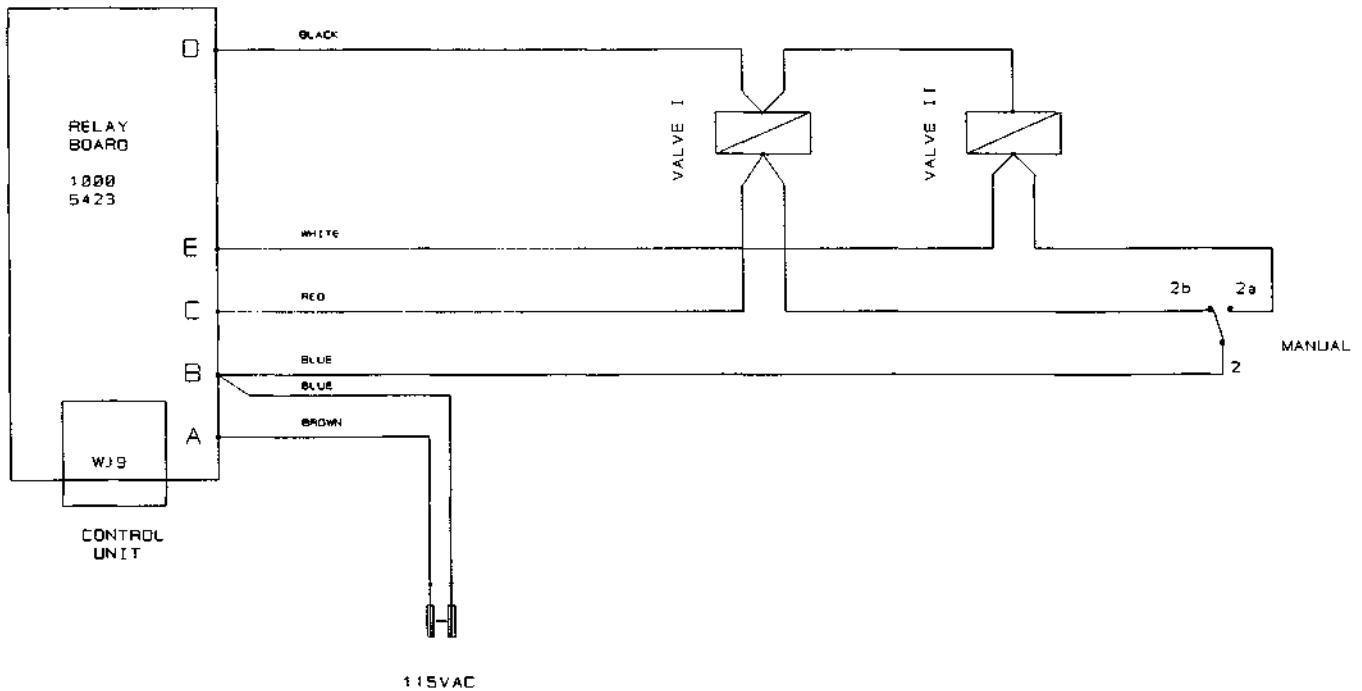
tecator	RITAD	940207	SNN	SKALA		VER.	2
				BLAD	1/1	FIL	85412.863
	NAMN: FLOW REGULATOR					RITN NR	1000 5412.863

2	Black was Green, White was Grey	940418	SNn

HIGH = I + II

LOW = II



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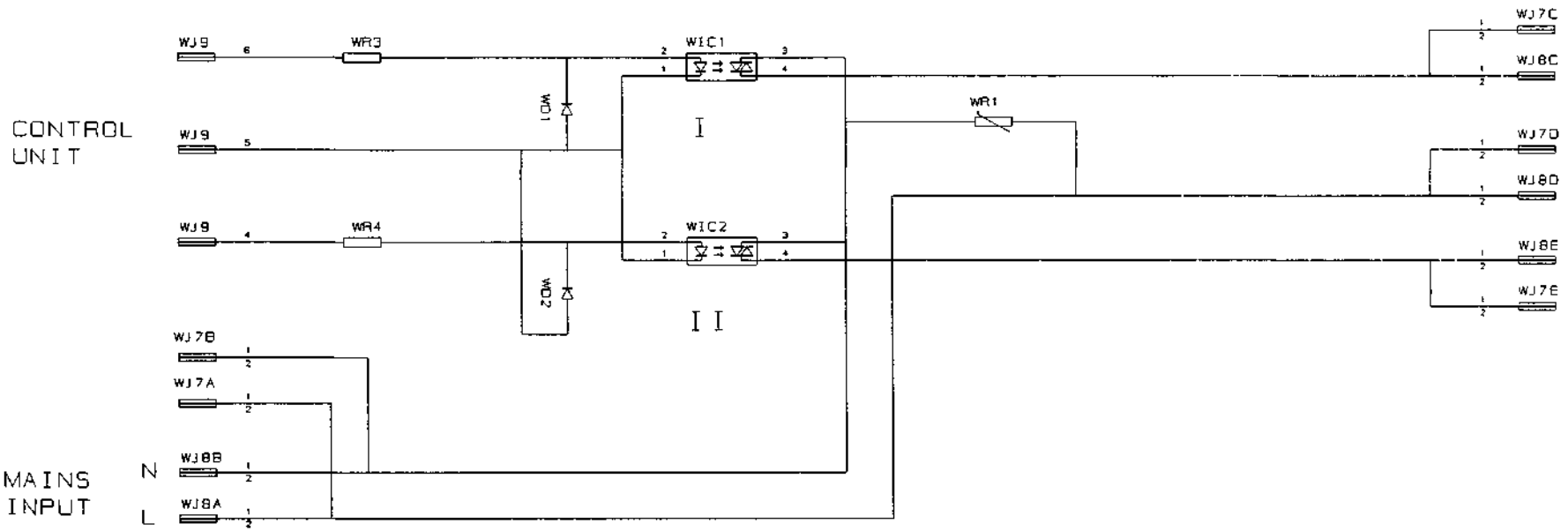
tecator	RITAD	940207	SNN	SKALA		VER.	2
				BLAD	1/1	FIL	85642.863
	NAMN: FLOW REGULATOR					RITN NR: 1000 5642 863	

HIGH = I+II

LOW = II



B:27

tecator

RITAD	940208	SNN	SKALA		VER.	4	
			BLAD	1/1	FIL	05425 813	
NAMN	RELAY BOARD				RITN NR	1000 5425 813	

C Appendix C

C.1 Parts List

The Parts List for 2000 Digestion System; DS 6-12, 20-40 is an appendix, with part no 1000 5889, which you can order seperately.

The same are for the Parts List 1015 Lift with part no 1000 6205 and for the Parts List 2015 Lift with part no 1000 6206.

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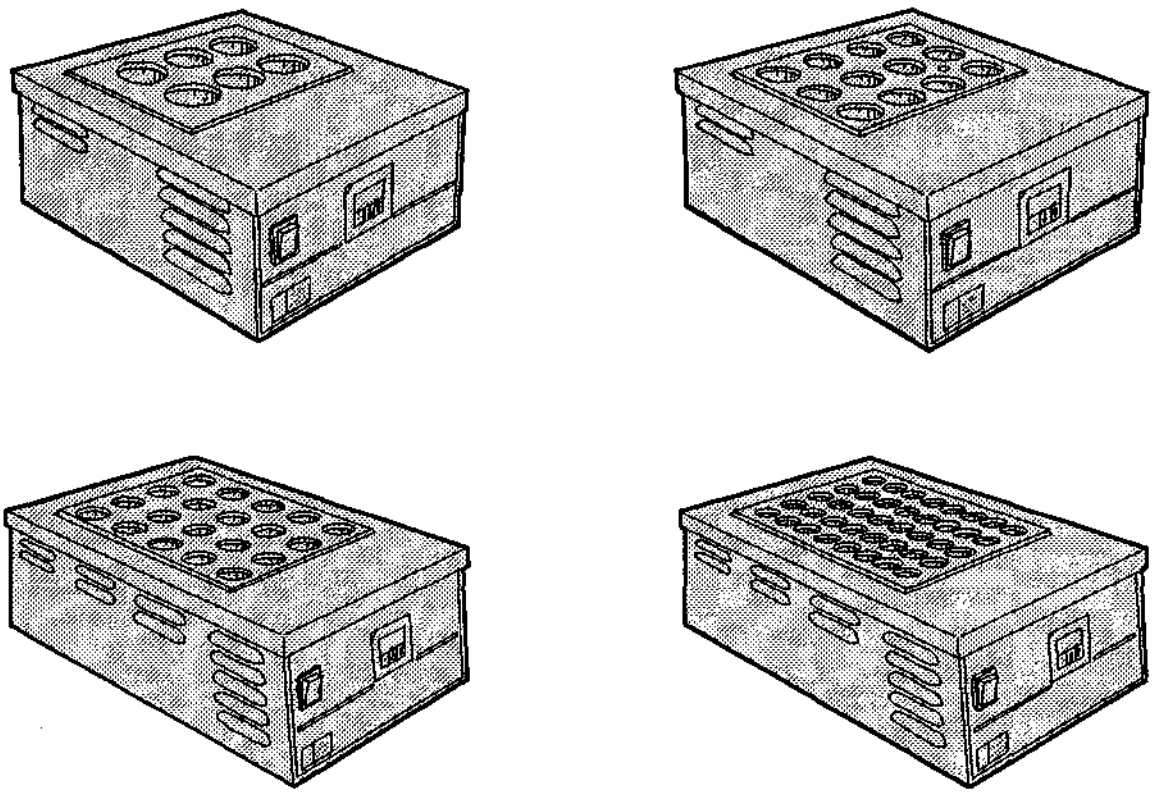
tecator



BLOC063a

Parts List
2000 Digestion System; DS 6-12, 20-40

1994-09-21 / Part no 1000 5889 / Rev 1.1

N.B Screws, nuts and washers are shown but not designated in this part list!

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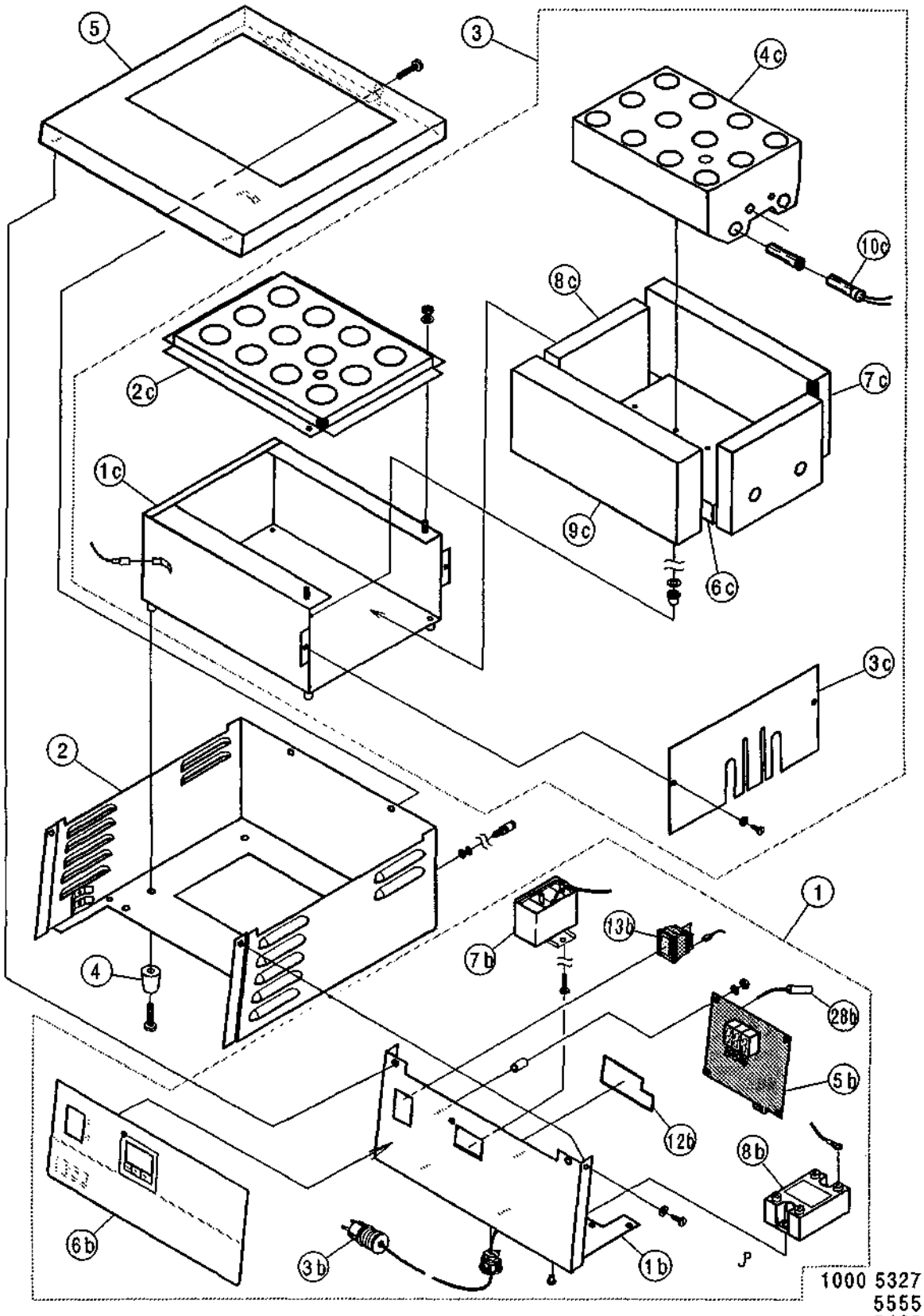
Tecator AB, Box 70, S-263 21 Höganäs, Sweden

Designation:	Digestor unit 6,12 cpl.
General drawing:	**1000 5327, 1000 5469 / 1000 5555, 1000 5556 230V/115V**
Effective from serial no:	to serial no:

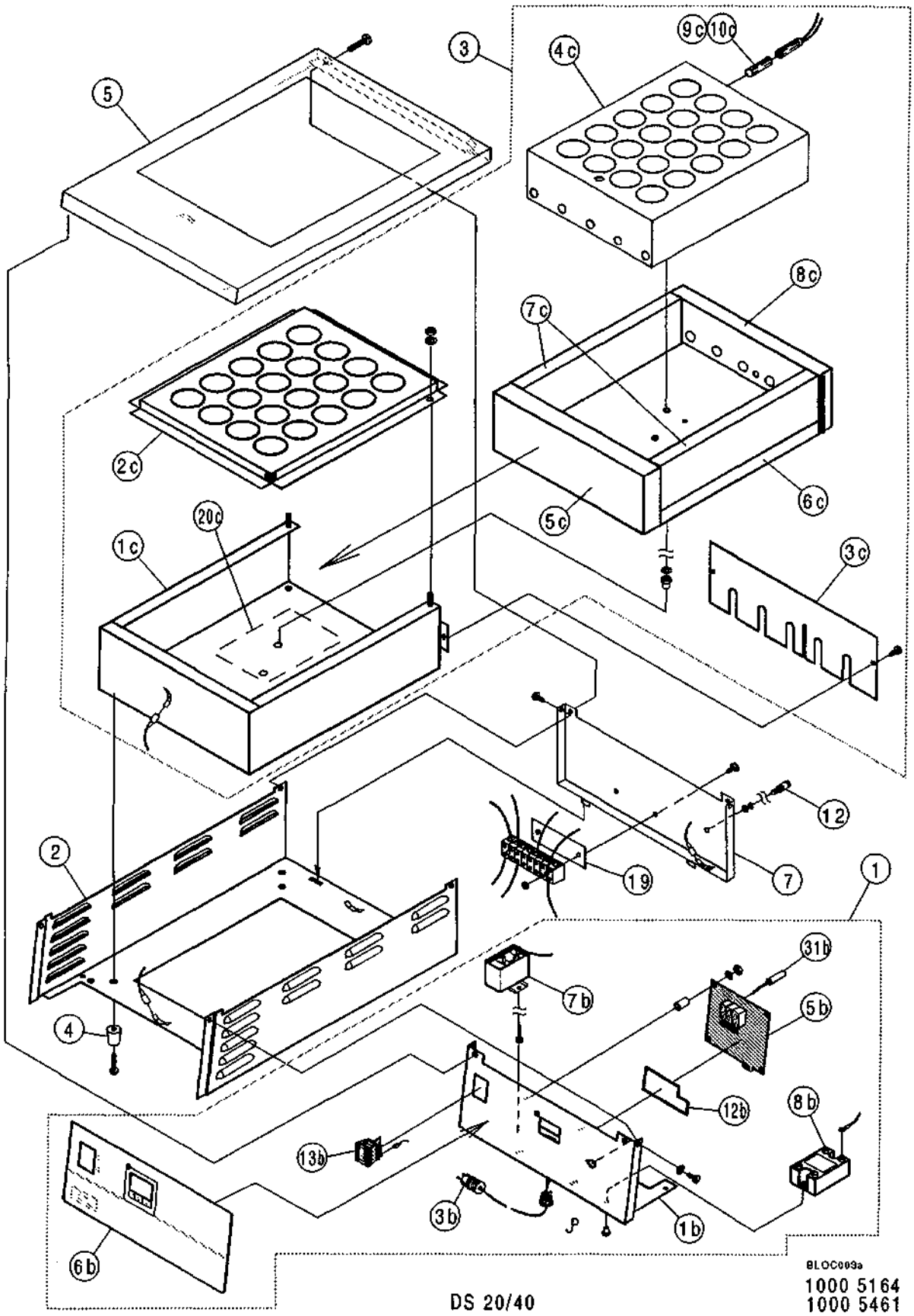
Pos	Part no	Designation	Remarks	
1	1000 5330	Front cpl.	230V/DS-6	
1	1000 5557	Front cpl.	115V/DS-6	
1	1000 5470	Front cpl.	230V/DS-12	
1	1000 5558	Front cpl.	115V/DS-12	
2	1000 5329	Outer box	230V/115V	
3	1000 5328	Inner box cpl.	230V/DS-6	
3	1000 5559	Inner box cpl.	115V/DS-6	
3	1000 5472	Inner box cpl.	230V/DS-12	
3	1000 5560	Inner box cpl.	115V/DS-12	
4	1547 0083	Foot		
5	1000 5331	Frame		
12	1561 0121	Earthscrew		
1b	1000 5341	Front		incl. in pos 1
3b	1561 0123	Cable stand	230V	incl. in pos 1
3b	1565 0029	Cable stand	115V	incl. in pos 1
5b	1000 5240	Temperature control PCB	230V	incl. in pos 1
5b	1000 5622	Temperature control PCB	115V	incl. in pos 1
6b	1000 5499	Panel foil	DS-12	incl. in pos 1
6b	1000 5515	Panel foil	DS-6	incl. in pos 1
7b	1579 0019	Overheat protector		incl. in pos 1
8b	1562 0022	Solid state relay		incl. in pos 1
12b	1000 5151	Insulating plate		incl. in pos 1
13b	1563 0001	Switch mains	230V	incl. in pos 1
28b	1563 0148	Temperature sensor		incl. in pos 1
1c	1000 5333	Inner box		incl. in pos 3
2c	1000 5334	Guide plate	DS-6	incl. in pos 3
2c	1000 5473	Guide plate	DS-12	incl. in pos 3
3c	1000 5336	Mica lamination		incl. in pos 3
4c	1000 5332	Block DS-6		incl. in pos 3
4c	1000 5475	Block DS-12		incl. in pos 3
5c	1000 5337	Insulating front		incl. in pos 3
6c	1000 5343	Insulating bottom		incl. in pos 3
7c	1000 5339	Insulating right		incl. in pos 3
8c	1000 5338	Insulating rear		incl. in pos 3
9c	1000 5340	Insulating left		incl. in pos 3
10c	1000 5621	Rod heater, 500W	230V	incl. in pos 3
10c	1000 5623	Rod heater, 500W	115V	incl. in pos 3


5
3
4c
10c
8c
2c
7c
1c
9c
6c
3c
2
1
7b
13b
4
28b
5b
12b
8b
6b
3b
1b
1000 5327
5555
5469
5556
BLOC002a

DS 6/12

Designation:	Digestor unit 20,40 cpl.
General drawing:	**1000 5164, 1000 5461 230V**
Effective from serial no:	**16297, 100** to serial no: **16603, 157**

Pos	Part no	Designation	Remarks	
1	1000 5320	Front cpl.	DS-20	
1	1000 5462	Front cpl.	DS-40	
2	1000 5147	Outer box		
3	1000 5319	Inner box	DS-20	
3	1000 5464	Inner box	DS-40	
4	1547 0083	Foot		
5	1000 5244	Frame		
7	1000 5307	Rear gable		
12	1561 0121	Earthscrew		
19	1000 5572	Insulating plate		
1b	1000 5148	Front		
3b	1561 0123	Cable stand		incl. in pos 1
5b	1000 5240	Temp control PCB		incl. in pos 1
6b	1000 5513	Panel foil	DS-20	incl. in pos 1
6b	1000 5514	Panel foil	DS-40	incl. in pos 1
7b	1579 0019	Overheat protector		incl. in pos 1
8b	1562 0022	Solid state relay		incl. in pos 1
12b	1000 5151	Insulating plate		incl. in pos 1
13b	1563 0001	Switch mains		incl. in pos 1
31b	1563 0148	Temperature sensor		incl. in pos 1
1c	1000 5149	Inner box		incl. in pos 3
2c	1000 5146	Guide plate	DS-20	incl. in pos 3
2c	1000 5465	Guide plate	DS-40	incl. in pos 3
3c	1000 5150	Mica lamination	DS-20	incl. in pos 3
3c	1000 5466	Mica lamination	DS-40	incl. in pos 3
4c	1000 5152	Block DS-20		incl. in pos 3
4c	1000 5468	Block DS-40		incl. in pos 3
5c	1000 5254	Insulating front		incl. in pos 3
6c	1000 5154	Insulating bottom		incl. in pos 3
7c	1000 5255	Insulating sides		incl. in pos 3
8c	1000 5256	Insulating rear	DS-20	incl. in pos 3
8c	1000 5467	Insulating rear	DS-40	incl. in pos 3
9c	1000 5624	Rod heater, 52V, 500W		incl. in pos 3
10c	1000 5625	Rod heater, 42V, 400W		incl. in pos 3
20c	1000 5406	Protection plate		incl. in pos 3

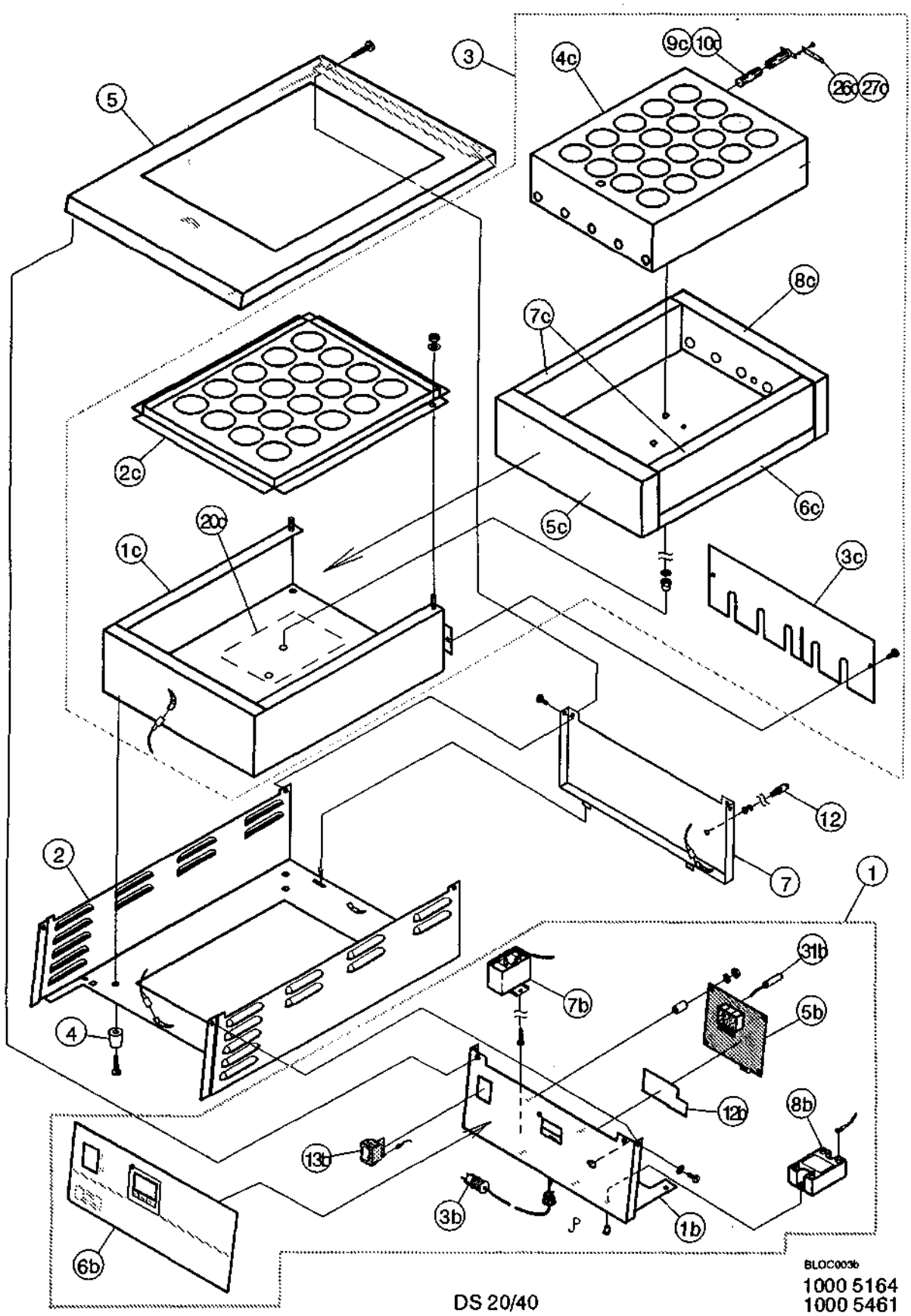


DS 20/40

1000 5164
1000 5461

Designation:	Digestor unit 20,40 cpl.
General drawing:	**1000 5164, 1000 5461 230V**
Effective from serial no:	**16604, 158** to serial no:

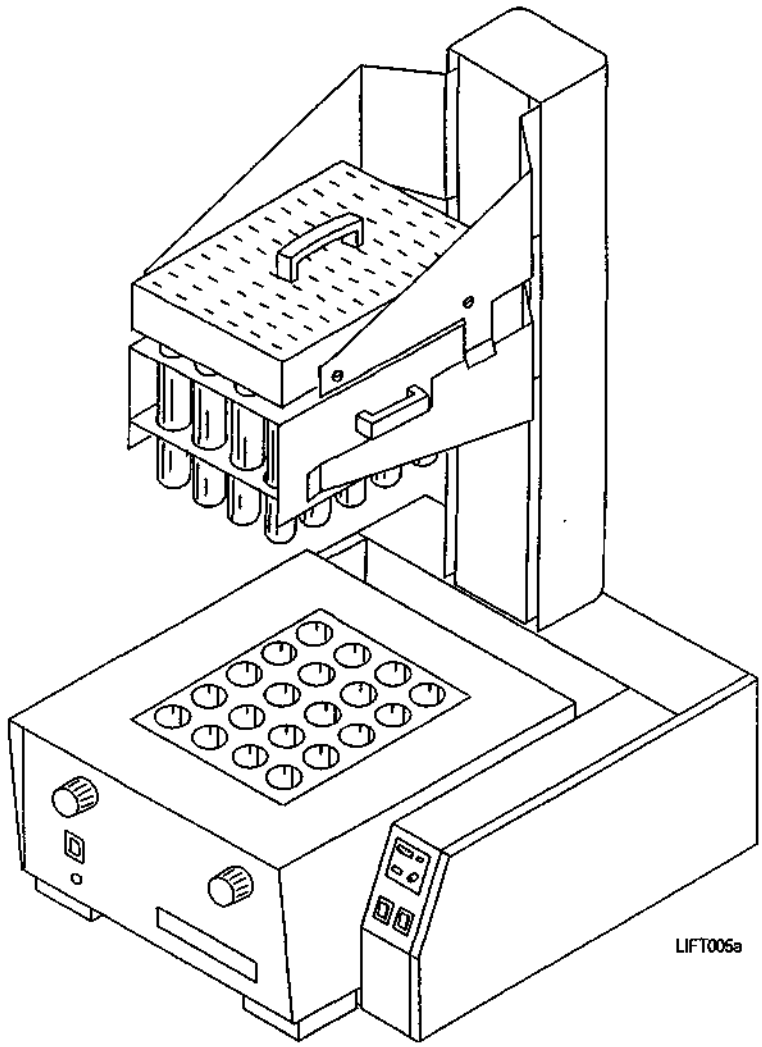
Pos	Part no	Designation	Remarks	
1	1000 5320	Front cpl.	DS-20	
1	1000 5462	Front cpl.	DS-40	
2	1000 5147	Outer box		
3	1000 5319	Inner box	DS-20	
3	1000 5464	Inner box	DS-40	
4	1547 0083	Foot		
5	1000 5244	Frame		
7	1000 5307	Rear gable		
12	1561 0121	Earthscrew		
1b	1000 5148	Front		
3b	1561 0123	Cable stand		incl. in pos 1
5b	1000 5240	Temp control PCB		incl. in pos 1
6b	1000 5513	Panel foil	DS-20	incl. in pos 1
6b	1000 5514	Panel foil	DS-40	incl. in pos 1
7b	1579 0019	Overheat protector		incl. in pos 1
8b	1562 0022	Solid state relay		incl. in pos 1
12b	1000 5151	Insulating plate		incl. in pos 1
13b	1563 0001	Switch mains		incl. in pos 1
31b	1563 0148	Temperature sensor		incl. in pos 1
1c	1000 5149	Inner box		incl. in pos 3
2c	1000 5146	Guide plate	DS-20	incl. in pos 3
2c	1000 5465	Guide plate	DS-40	incl. in pos 3
3c	1000 5150	Mica lamination	DS-20	incl. in pos 3
3c	1000 5466	Mica lamination	DS-40	incl. in pos 3
4c	1000 5152	Block DS-20		incl. in pos 3
4c	1000 5468	Block DS-40		incl. in pos 3
5c	1000 5254	Insulating front		incl. in pos 3
6c	1000 5154	Insulating bottom		incl. in pos 3
7c	1000 5255	Insulating sides		incl. in pos 3
8c	1000 5256	Insulating rear	DS-20	incl. in pos 3
8c	1000 5467	Insulating rear	DS-40	incl. in pos 3
9c	1000 6071	Rod heater, 52V, 500W		incl. in pos 3
10c	1000 6072	Rod heater, 42V, 400W		incl. in pos 3
20c	1000 5406	Protection plate		incl. in pos 3
26c	1000 6033	Tinplate		incl. in pos 3
27c	1000 6034	Tinplate	DS-20	incl. in pos 3



DS 20/40

1000 5164
1000 5461

tecator



Parts List 1015 Lift

1994-09-04 / Part no 1000 6205 / Rev 1.0

N.B Screws, nuts and washers are shown but not designated in this part list!

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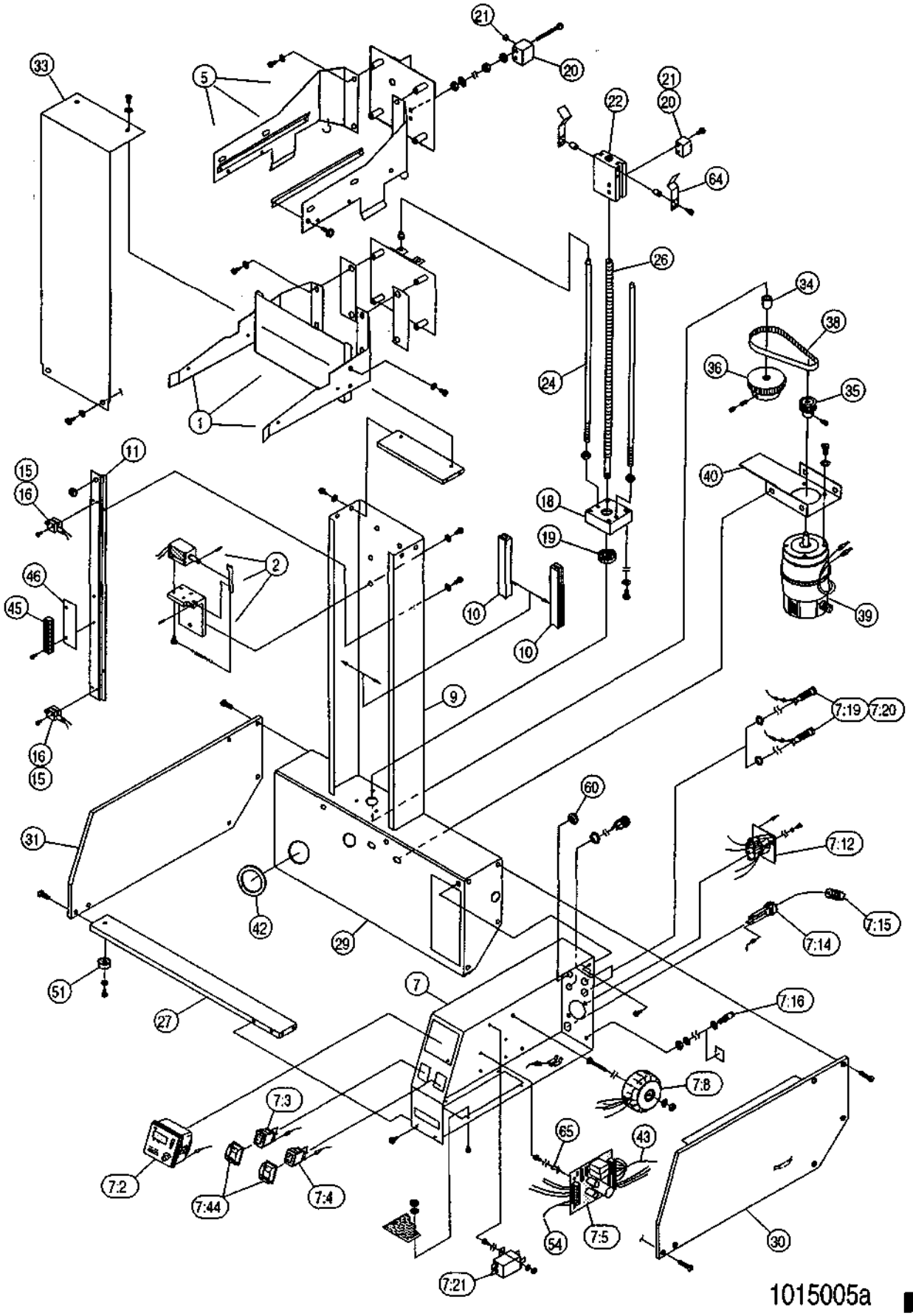
Tecator AB, Box 70, S-263 21 Höganäs, Sweden

Designation:	Lift 200-240V 50Hz
General drawing:	**1000 4922**
Effective from serial no:	to serial no:

Pos	Part no	Designation	Remarks
1	1000 5038	Trippet cpl.	
2	1000 5040	Magnet cpl.	
5	1000 5037	Exhaust arm cpl.	
7	1000 5036	Panel cpl.	
7:1	1000 4838	Panel	
7:2	1579 0018	Timer	
7:3	1563 0141	Switch 250V	
7:4	1563 0142	Switch 220V	
7:5	1000 5082	Relay card	
7:8	1568 0021	Transformer	
7:12	1565 0039	Socket	
7:14	1561 0125	Cable inlet	
7:15	1561 0123	Main cable	
7:16	1561 0121	Earth screw	
7:19	1564 0104	Fuse holder	
7:20	1564 0049	Fuse 1,6AT	
7:21	1568 0002	Mains filter	
7:44	1563 0146	Protecting cover	
9	1000 4829	Lift tower	
10	1000 4833	Guide bar	
11	1000 4831	Sensor attachment	
15	1563 0117	Sensor	
16	1000 3344	Holder	
18	1000 4832	Slide bearing	
19	1545 0042	Ball bearing	
20	1000 4840	Holder for Magnet	
21	1543 0004	Magnet	
22	1000 4841	Slide nut	
24	1000 4943	Guide rod	
26	1000 4837	Guide screw	
27	1000 4886	Cross bar	
29	1000 4899	Lift chassi	
30	1000 4900	Gable right	
31	1000 4901	Gable left	
33	1000 4911	Covering plate	
34	1000 4842	Spacer	
35	1000 4944	Threaded driving wheel Z=16	
36	1000 4945	Threaded driving wheel Z=44	
38	1545 0049	Threaded driving belt	
39	1571 0026	Motor	
40	1000 4834	Holder for Motor	



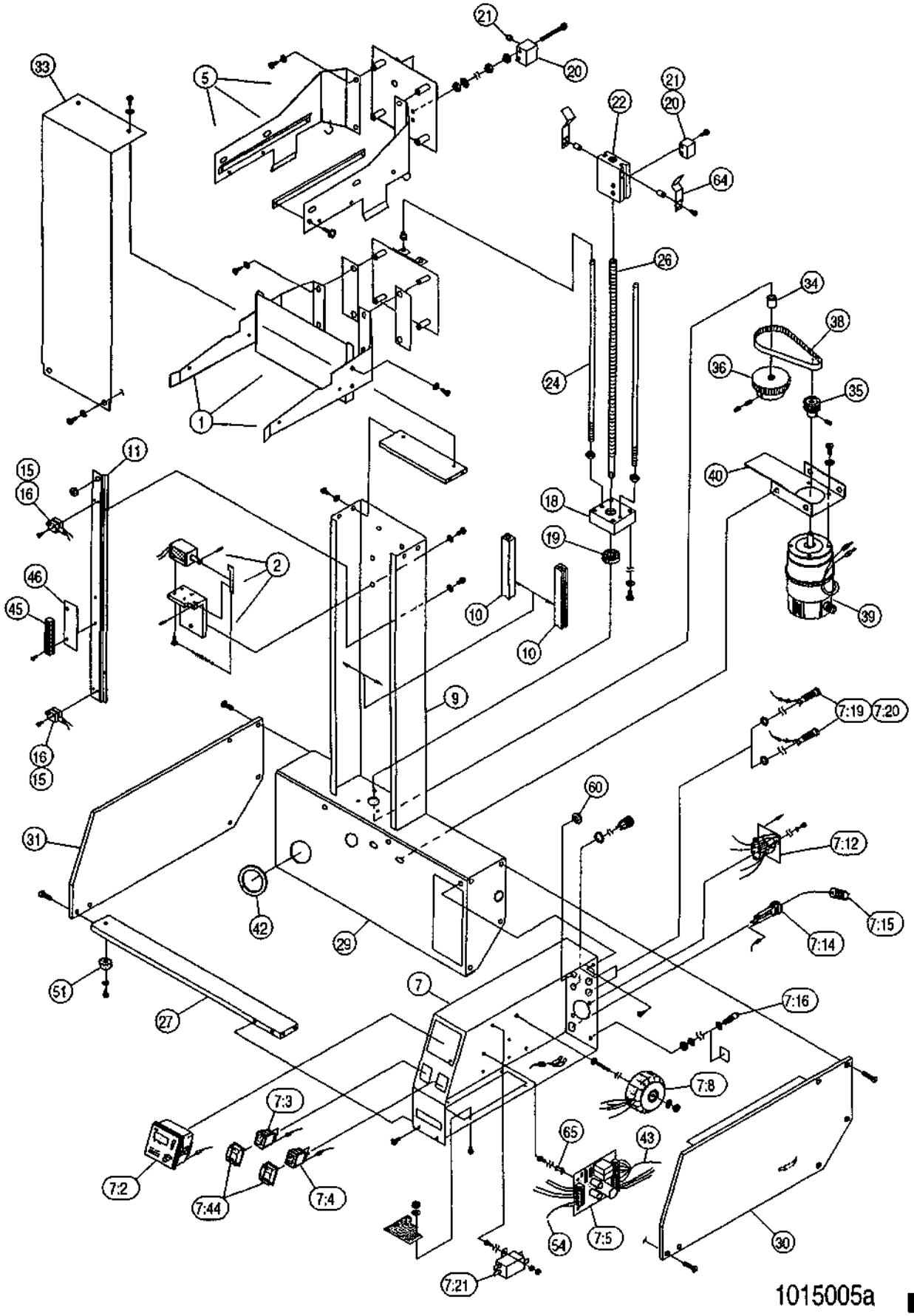
1015005a

LIFT

1000 4922

Designation:	Lift 200-240V 50Hz
General drawing:	**1000 4922**
Effective from serial no:	to serial no:

Pos	Part no	Designation	Remarks
42	1549 0048	Edge list	
43	1000 5158	Cable unit	
45	1569 0114	Plinth	
46	1569 0115	Plinth label	
51	1547 0081	Foot	
54	1561 0278	Cable	
60	1569 0003	Rubber grommet	
64	1000 5261	Plate spring	
65	1539 0023	Distance tube	



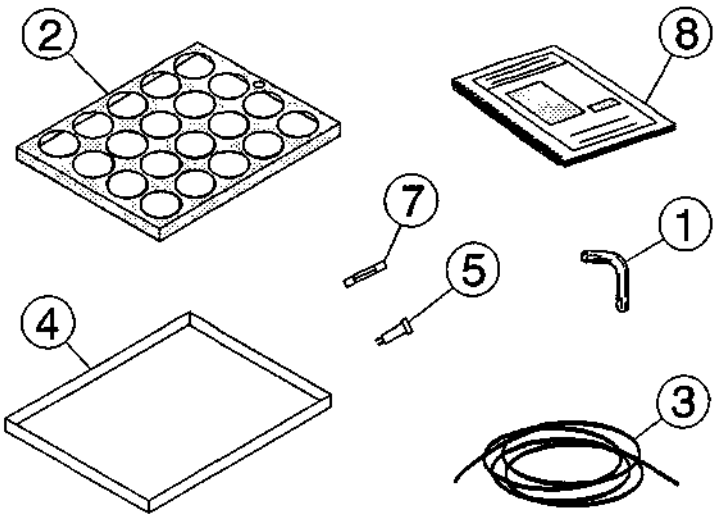
1015005a ■

LIFT

1000 4922

Designation:	Accessories Lift
General drawing:	**10005142**
Effective from serial no:	to serial no:

Pos	Part no	Designation	Remarks
1	1000 5061	Hose-coupling nipple	
2	1000 5134	Guide plate cpl.	
3	1582 0017	Tubing	
4	1000 0415	Driptray, white	
5	1564 0106	Fuse cap	
7	1564 0049	Fuse 1,6 AT	
8	1000 5221	Manual 1015/2015 Lift	



2015013a

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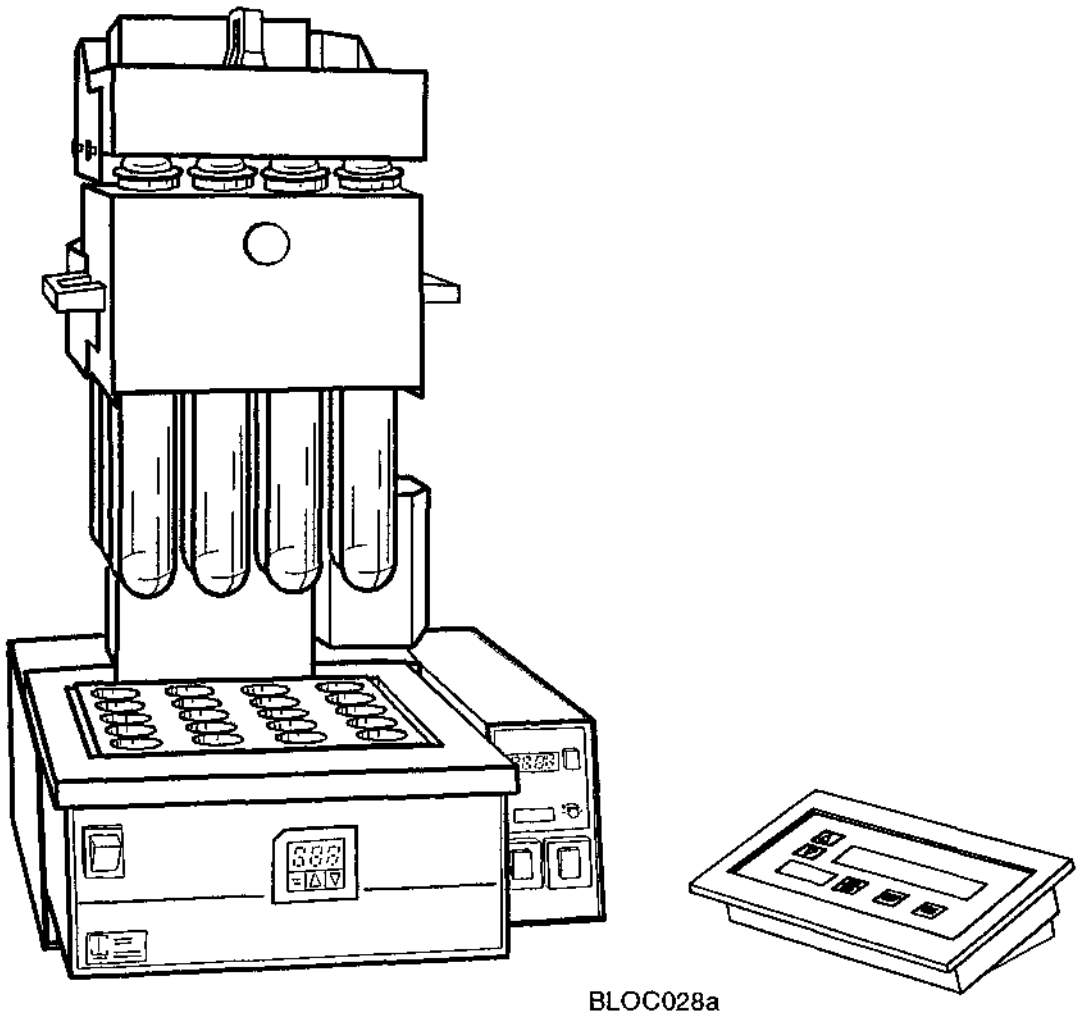

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Parts List 2015 Lift

1996-01-17 / Part no 1000 6206 / Rev 1.1

N.B Screws, nuts and washers are shown but not designated in this part list!

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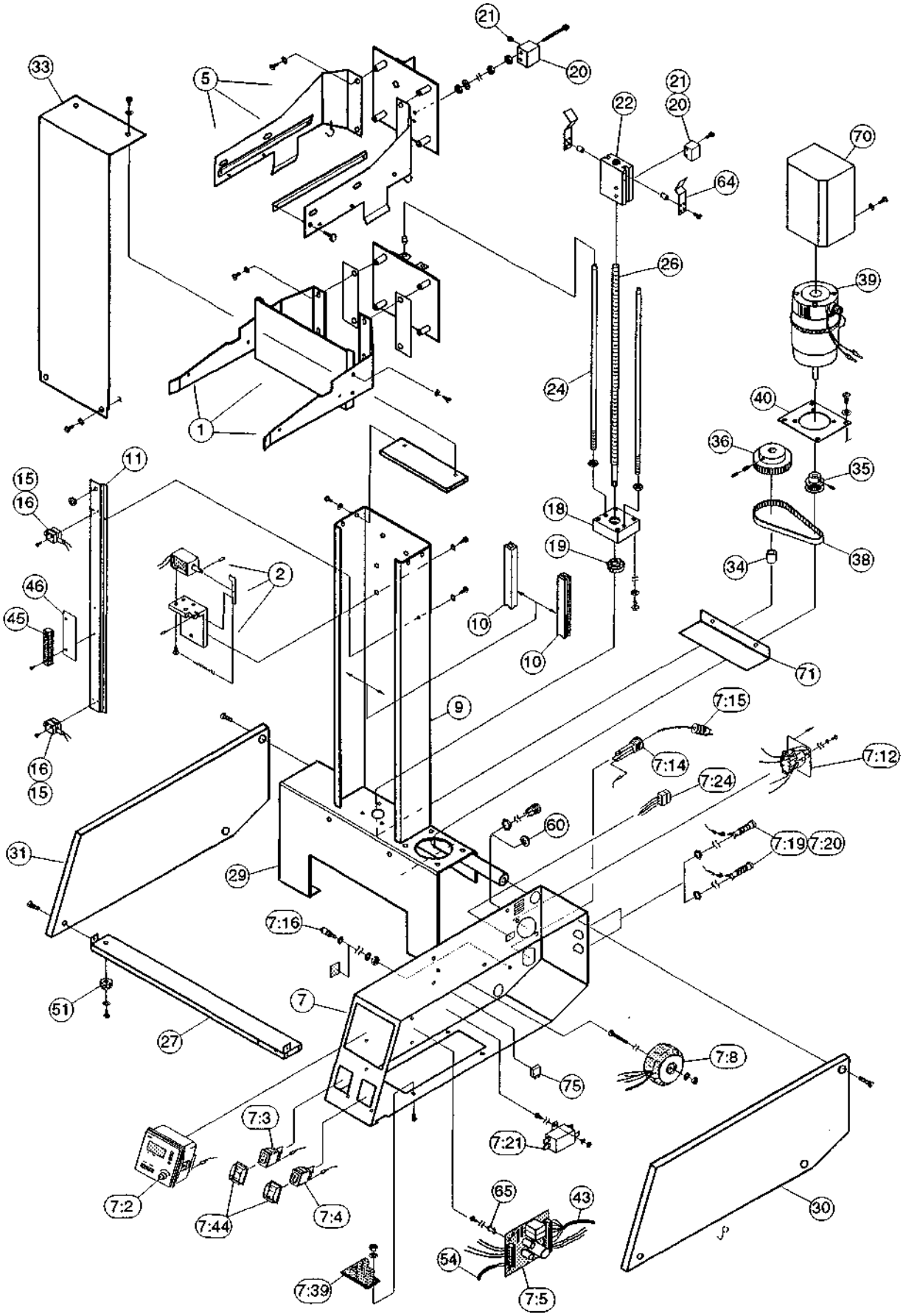
Tecator AB, Box 70, S-263 21 Höganäs, Sweden

Designation:	Lift 200-240 V 50/60 Hz
General drawing:	**1000 5520, 1000 5521**
Effective from serial no:	to serial no:

Pos	Part no	Designation	Remarks
1	1000 5517	Tube stand arm cpl.	
2	1000 5040	Magnet cpl.	
5	1000 5518	Exhaust arm cpl.	
7	1000 5519	Panel cpl. 50 Hz	
7	1000 5522	Panel cpl. 60 Hz	
7:1	1000 5505	Panel	
7:2	1000 5447	Timer 50 Hz	
7:2	1000 5448	Timer 60 Hz	
7:3	1563 0141	Switch 250 V 16 A	
7:4	1563 0142	Switch 220 V 16 A	
7:5	1000 5082	Relay card	
7:8	1568 0021	Transformer	
7:12	1565 0039	Socket	
7:14	1561 0125	Cable inlet	
7:15	1561 0123	Main cable	
7:16	1561 0121	Earth screw	
7:19	1564 0091	Fuse holder	
7:20	1564 0049	Fuse 1,6AT	
7:21	1568 0002	Mains filter	
7:24	1000 5726	Phone connector	
7:38	1569 0003	Rubber grommet	
7:39	1000 4946	Protection plate	
7:44	1563 0146	Protecting cover	
9	1000 5502	Lift tower	
10	1000 4833	Guide bar	
11	1000 4831	Sensor attachment	
15	1563 0117	Sensor	
16	1000 3344	Holder	
18	1000 4832	Slide bearing	
19	1545 0042	Ball bearing	
20	1000 4840	Holder for Magnet	
21	1543 0004	Magnet	
22	1000 4841	Slide nut	
24	1000 4943	Guide rod	
26	1000 4837	Guide screw	
27	1000 4886	Cross bar	
29	1000 5578	Lift chassi	
30	1000 5503	Gable right	
31	1000 5504	Gable left	
33	1000 4911	Covering plate	
34	1000 4842	Spacer	

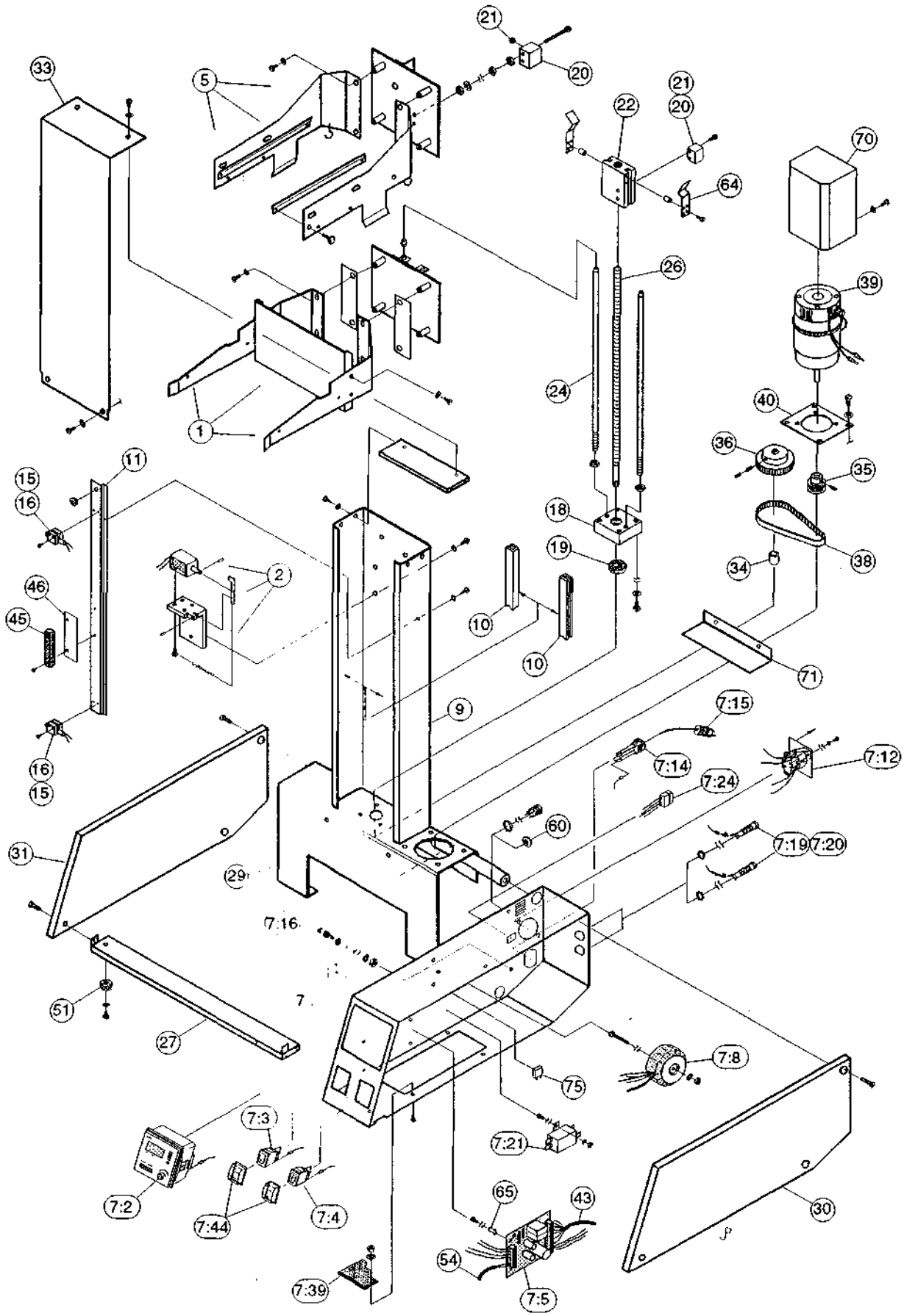


LIFT

2015006a

Designation:	Lift 200-240 V 50/60 Hz
General drawing:	**1000 5520, 1000 5521**
Effective from serial no:	to serial no:

Pos	Part no	Designation	Remarks
35	1000 4944	Threaded driving wheel Z=16	
36	1000 5580	Threaded driving wheel Z=42	
38	1545 0050	Threaded driving belt	
39	1571 0026	Motor	
40	1000 5511	Holder for Motor	
43	1000 5158	Cable unit	
45	1569 0114	Plinth	
46	1569 0115	Plinth label	
51	1547 0081	Foot	
54	1561 0278	Cable	
60	1569 0003	Rubber grommet	
64	1000 5261	Plate spring	
65	1539 0023	Distance tube	
70	1000 5510	Motor protection	
71	1000 5587	Drive belt protection	
75	1567 0066	RC-net (capacitor)	

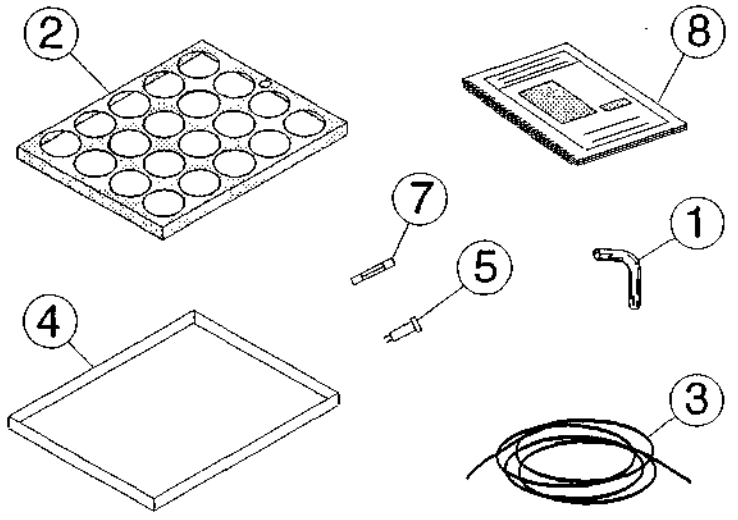


LIFT

2015006a

Designation:	Accessories Lift
General drawing:	**1000 5142**
Effective from serial no:	to serial no:

Pos	Part no	Designation	Remarks
1	10005061	Hose-coupling nipple	
2	10005134	Guide plate cpl.	Only for the 1015 Lift and old type of digestors
3	15820017	Tubing	
4	10000415	Driptray, white	
5	15640106	Fuse cap	
7	15640049	Fuse 1,6 AT	
8	10005221	Manual 1015/2015 Lift	



2015013a